SERVICEMANUAL

V11580

ESCOM

MONITOR

DX-17F

BAUGLEICH: MAG DX-17F

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1. Features

DX17F is the new generation of color display. It has the following features:

(1) Digital control:

(a) User friendly digital controls for screen adjustments.

(b) Memory for 8 user display modes.

(2) Power saving system:

DX17F is so-called a green product that makes DX17F be more friendly to our environment. DX17F is able to conserve 75% of power in Suspend Mode and more than 95% of power in Off Mode.

(3) Wide range of horizontal frequency input from 30 ~ 64 kHz. Vertical frequency input from 50 ~ 100 Hz.

This range makes the DX17F compatible with video standards from VGA to XGA. It also has a 100 MHz video bandwidth.

(4) Autoswitch power supply, from 90 ~ 132 Vac or 180 ~ 264 Vac

It makes DX17F accept all kinds of AC supply anywhere in the world.

2. Specifications

Picture Tube

17" 0.26mm dot pitch

Resolution

1280 x 1024 max.

Display colors

Unlimited

Scanning frequency

Horizontal: 30 ~ 64 kHz

Vertical: 50 ~ 100 Hz

Power saving system

Power saving mode	*Maximum Power consumption*
On	120W
Suspend	30W
Off	5W

Display area

300 x 220

Video bandwidth

100 MHz

Input signal

Video: analog 0.7 Vp-p on 75 Ohm load

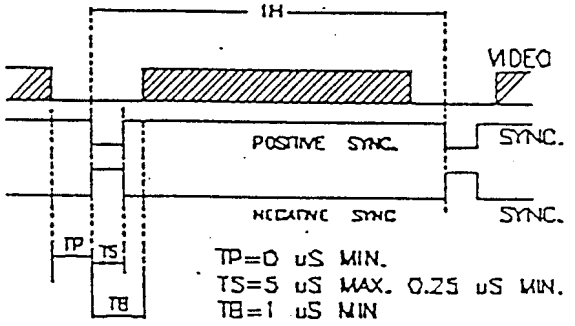
Sync: separate or composite, positive or negative, TTL

Power Input

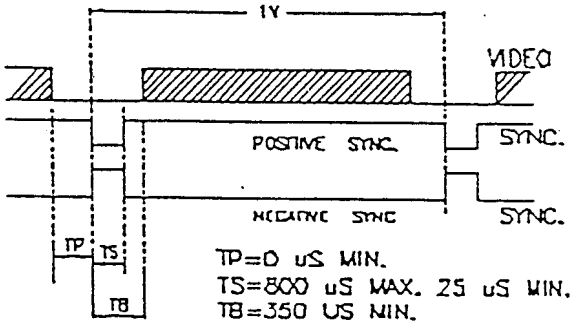
90 ~ 130 Vac or 180 ~ 260 Vac autoswitchable

3. Recommended Input Signal Timing

RECOMMAND TIMING:SEPARATE SYNC.



TP=0 uS MIN.
TS=5 uS MAX. 0.25 uS MIN.
TB=1 uS MIN



TP=0 uS MIN.
TS=800 uS MAX. 25 uS MIN.
TB=350 US MIN.

3.1 Pin Assignment

The pin assignment of the video cable is listed in Table 3.1. This is for your information only; please do not attempt to devise your own connections as this may damage the monitor..

1	Red
2	Green
3	Blue
4	Ground
5	No Connection
6	R-Ground
7	G-Ground
8	B-Ground
9	No Connection
10	Ground
11	Ground
12	No Connection
13	H-Sync (Composite sync)
14	V-Sync
15	No Connection

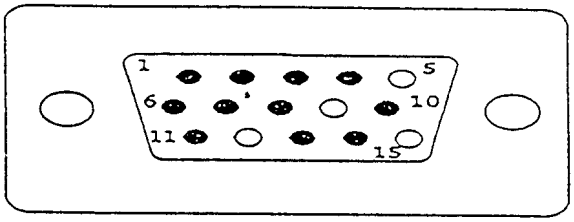


TABLE 3.1

4. Block Diagrams

4.1 Monitor Block Diagram

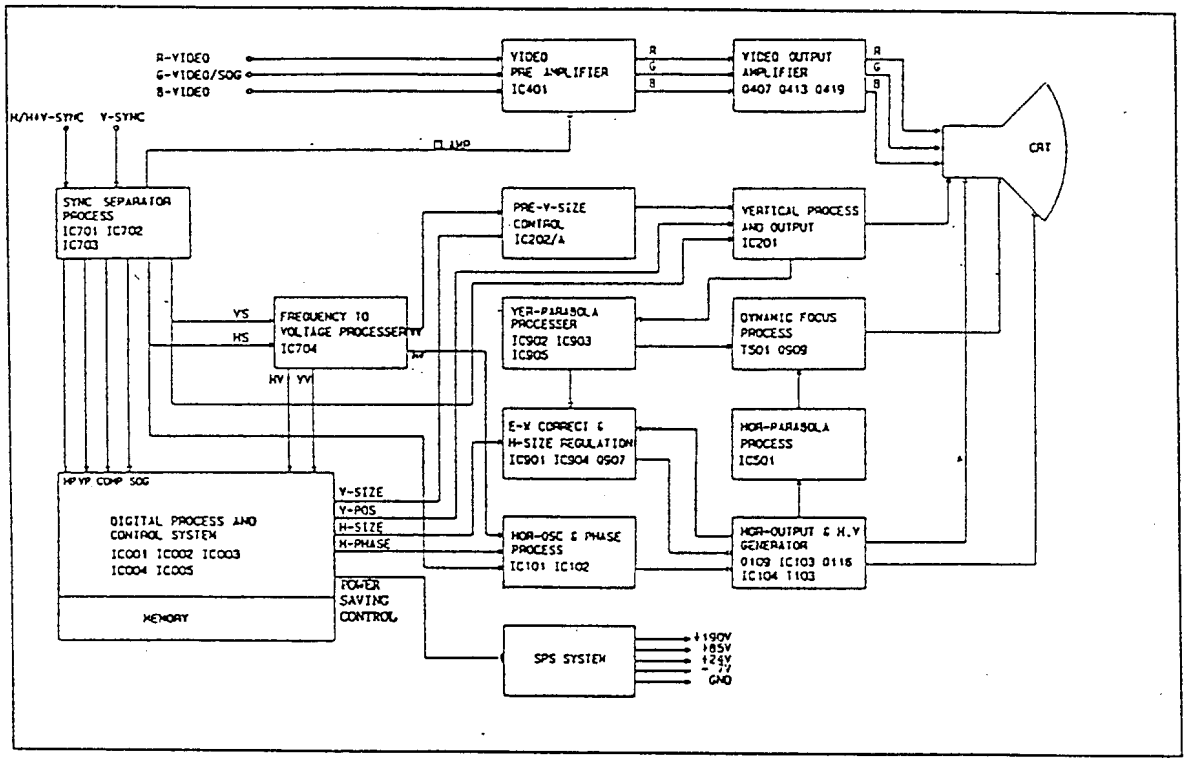


Figure 4.1

4.2 Switching Power Supply Block Diagram

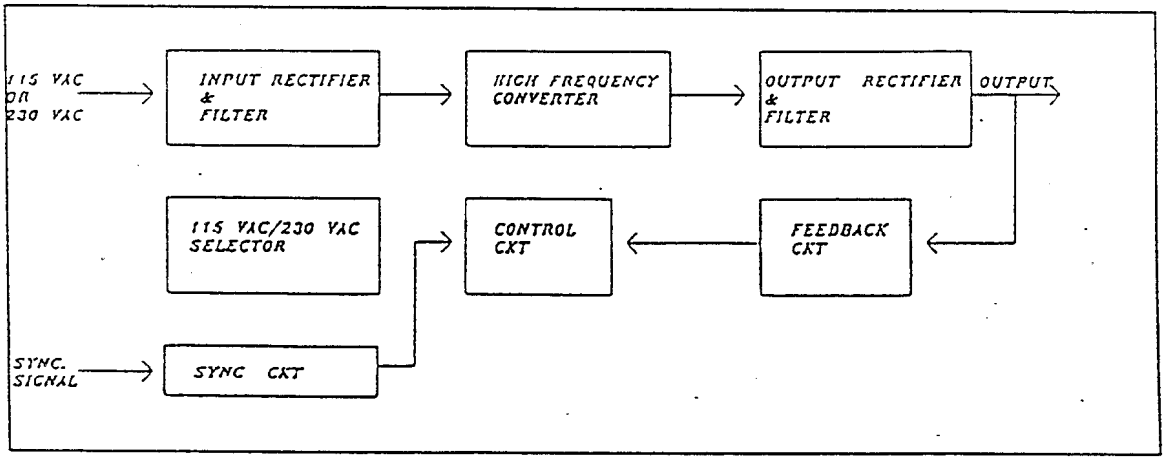


Figure 4.2

5. Controls

There are a few switches, indicators and User Adjustable Controls on the DX17F. These provide the user a way to maximize the display to his or her preferences. A description of their functions is presented as below.

5.1 Front Panel Controls

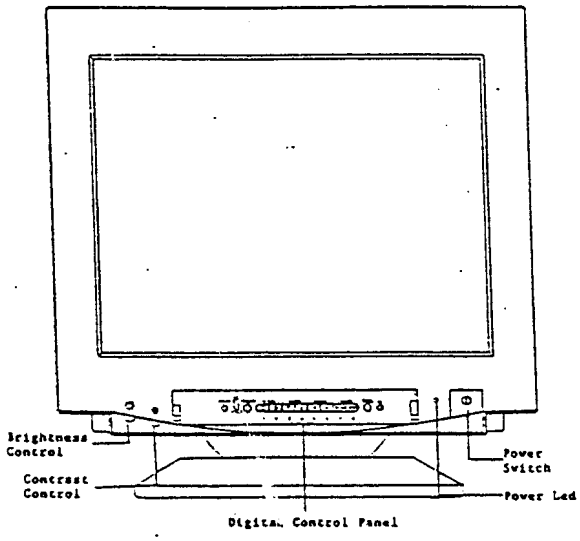


Figure 5.1

1. Power Button

Press this button to turn the power ON or OFF. There will be a 2 second delay before the display appears.

2. Power LED

Since DX17F has Power Saving Utilities, under different mode of the power management the LED displays differently to show which mode is active. When the On mode is active, the LED indicator goes green in color. It will become orange when the Suspend mode is activated. Whenever it enters into the Off mode, the LED indicator will remain orange and begin flashing alternatively.

3. *Brightness Control*

This dial allows you to adjust the brightness level of the display screen. Rotate this dial clockwise to increase brightness; counter clockwise to decrease brightness.

4. *Contrast Control*

This dial allows you to adjust the contrast of the display screen. Rotate this dial clockwise to increase contrast; counter-clockwise to decrease contrast.

5.2 *Digital Control Panel*

The digital control panel is concealed behind the hinged door. Push at the arrow to open the hinged door and reveal the digital control panel.

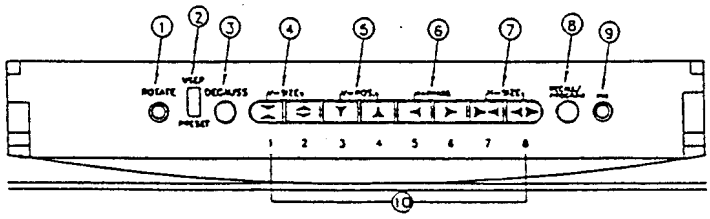


Figure 5.2

1. *Rotate Control*

The rotate control can be used for fine adjustment of image tilt.

2. *Preset/User Selector*

This selector toggles the monitor between Preset or User status of operation.

3. *Degauss Button*

The button manually degausses the CRT.

4. *Vertical Size (V-Size) Controls*

Press ⧖ to decrease the vertical size (display height); press ⧋ to increase the vertical size.

5. *Vertical Position (V-Pos) Controls*

Press ▽ to shift the display down; press △ to shift the display up.

6. *Horizontal Phase (H-Phase) Controls*

Press ◁ to shift the display left; press ▷ to shift the display right.

7. *Horizontal Size (H-Size) Controls*

Press ⋈ to decrease the horizontal size (display width); press ◁▷ to increase the horizontal size.

8. *Recall/Program Button*

When the Preset/User selector is set to Preset, this button acts as the recall button which recalls the factory default settings. When the Preset/User selector is set to User, this button acts as the program button. The user may program the present display mode as any one of the unused User modes, or overwrite a previous programmed User mode.

9. *Pincushion Control*

The pincushion control can be used to adjust pincushion or barrel distortions.

10. *User Mode Buttons #1 through #8*

Besides the functions mentioned above, the 8 digital screen format control buttons also act as the User Mode Selection Buttons #1 through #8 when the monitor is being programmed in the User Status.

5.3 *Rear Panel Controls*

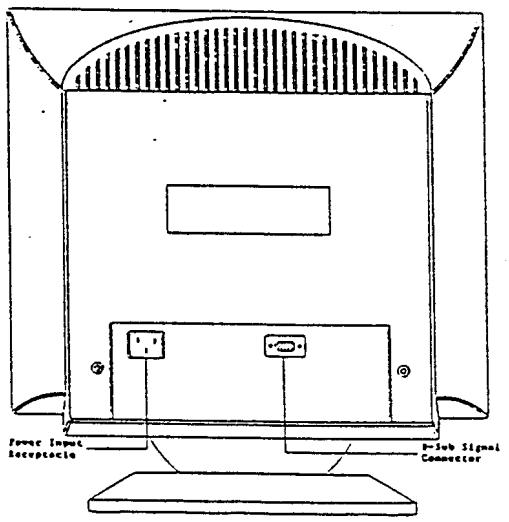


Figure 5.3

1. Power Input Receptacle

This receptacle accepts the female end connector of the supplied power cord. Attach the power cord to this receptacle, then plug it into a properly grounded AC or PC outlet to supply power to the DX17F.

2. Signal Connector

The DX17F has a 15-pin mini D-sub connector which should be attached to your video display adapter.

6. Description of Circuits

6.1. Sync Board

ξ Sync Process Circuit

In order to keep the monitor be able to work on signal of different frequencies and modes, the input signals shall be processed to make sure that the signals to the next sections will be independent of the input signals.

This process is divided into two parts :

- Horizontal sync process circuit
- Vertical sync process circuit

Horizontal Sync Process Circuit

The input horizontal signal is sent to the pin 12 of IC701/D. The circuit of R703 and C702 is used to ensure that the output pulse always remains positive pulse, independent of the polarity of the input signal. In addition , it is an integrated circuit which level will be transmitted to CPU as a control signal. The output from the pin 11 of IC701/D goes along two paths, one is to IC701/B and the other one is through the circuit that consists R705, C703, R707, C704 and IC701/C. R705, C703, R707, C704 and IC701/C are combined together to be able to extract the vertical sync signal if it is a composite sync signal. If the input signal is horizontal sync signal only, the output from the pin 8 of IC701/C will be at LOW that makes the output from the pin 5 of IC701/B be considered as LOW. Therefore, the output is dependent on the pin 11 of IC701/D which is the horizontal sync signal at that moment. On the other hand, if the input is a composite sync signal, then the output of IC701/D will consists of horizontal and vertical sync signals and the output of IC701/C is the vertical sync signal at that time. Consequently, the output of IC701/B will also be the horizontal sync signal only because of the characteristic of a XOR gate. The output of IC701/C is also submitted to IC702/C which works as a buffer. The output of IC702/C connects R717 to produce a control signal. Moreover, it also connects R716 to act as a vertical sync signal to the Vertical Sync Process Circuit when it is a composite

sync signal. R717 controls Q704 to make its collector to be at HIGH LEVEL during separate sync signal and to be at LOW LEVEL during composite sync signal. The level of Q704's collector controls IC702/A and IC702/B. Such that the CLAMP pulses will be positive H-sync pulses during separate sync signal while they will be negative during composite sync signal.

Vertical Sync Process Circuit

The input vertical sync signal, from W403's VS is sent to the pin 2 of IC701/A through Q702 which functions as an inverting buffer. R713, C706 and the pin 1 of IC701/A make the output of IC701/A be a positive vertical sync signal. R713 and C706 is an integrated circuit that gets different level corresponding to the different input vertical sync signal. Besides determining the output of IC701/A, that level will also submitted to CPU as a control signal. The output of IC701/A goes into two paths, one is to the pin 12 of IC702/D, another is through a circuit composed of D702, R714, R715 and Q703 to generate a control signal. The base of Q703 will be at HIGH LEVEL with the separate sync signal so that the pin 13 of IC702/D always remains at LOW LEVEL and the output from the pin 11 of IC702/D will be the same as the pin 12. When it is a composite sync signal, the output of IC701/A will be at LOW LEVEL that makes the pin 12 of IC702/D and the base of Q703 also be at LOW. Then, the output of IC702/C that is a vertical sync signal then will be submitted to pin13 of IC702/D to make the output from the pin 11 of IC702/D is still a vertical sync signal as the same as its pin 13.

In order to clarify the differences between the separate input sync signal and the composite one. The reactions of several points that we have discussed above in the Sync Process Circuit are presented in TABLE 1.

Type	*IC 701 pin 11*	*Q 704 collector*	*IC 702 pin 8*	*IC 701 pin 3*	*Q 703 base*	*IC702 pin 11*
Separate	*Hor. Sync*	*HIGH*	*LOW*	*Ver. Sync*	*HIGH*	*Ver. Sync*
Composite	*Comp. Sync*	*LOW*	*Ver. Sync*	*LOW*	*LOW*	*Ver. Sync*

✞ Hor.Sync : horizontal sync signal only.
Comp. Sync : composed of horizontal and vertical sync signals.
Ver. Sync : vertical sync signal only

TABLE 1

ξ *Frequency to Voltage Converter Circuit*

Processed Sync signals are not only transmitted to Oscillation Circuits as triggers but also sent to Horizontal conversion at IC704/B and Vertical conversion at IC704/A by means of a Frequency to Voltage converter. As the DC voltages after the conversion are required to be highly stable and accurate, time constants at the pin 10 and pin 6 of IC704 are set to H≅ 14 us and V≅ 8 ms, respectively. Those specific values are achieved by adjusting VR701 and VR702. Then DC levels are generated at HV+ and VV+ after the RC filtration. The DC levels are transmitted to CPU for frequency detection. Moreover, they are also sent on purpose to accomplish H-Phase compensation, Horizontal frequency tracking as well as H-Size and V-Size compensation.

When there are not horizontal and vertical signals, the pin 10 of IC704/A and the pin 6 of IC704/B will be at LOW LEVEL. Then, the circuit that contains R723, R724, Q705, D703, and D704 will sent a fixed voltage to prevent the horizontal width and vertical height of the monitor from being too small.

ξ *Horizontal Oscillation Circuit*

Horizontal Sync pulses (H-SYNC) are inputted to the pin 1 of IC101. Besides providing the horizontal oscillation which is the vital part of the horizontal deflection circuit, IC101 also comprises Sync delay, AFC, X-ray protective functions, etc. The pin 2 is connected to Q101 to W102 for external H-Phase control while pin 3 is for phase pre-setting by adjusting VR103. The Hor-O/P pulses feed back the pin 4 for AFC (Automatic Frequency Control) while pin 7 is the AFC compensation circuit. Pin 5 generates triangular waves where C109 is the factor of charge & discharge the timing. Pin 6 is DC level for the reference of pin 5. Pin 8 is the source of the horizontal oscillation while VR102, R118, C113 decide the frequency.

If the horizontal frequency scans from 30Khz to 68Khz, there must have an automatic tracking circuit to hold the I/P frequency accurately. There are two paths to control the H-Phase at the pin 2 externally. IC102/B gets reference voltage from horizontal frequency/voltage converter to change the H-Phase according to the frequency of the Horizontal Sync. In addition, CPU can submit different LEVEL according to different timings to change the H-Phase via Q101. On the other hand, IC102/A and Q104 together combine a tracking circuit where tracking voltage is decided by VR101. D102 (Yellow LED) acts as a Zener diode to indicate if the frequency is too high. Pin 9 is a discharge circuit of horizontal oscillation. Pin 10 is B+ (12V) and Pin 11 decides the H-duty cycle by the radio of R120/R121. The High/Low ratio is set to 6:4. The horizontal drive output (HD) of the pin 12 will transmit through a output stage that is formed by Q105 and Q106 to other circuits.

ξ *Horizontal Frequency Switching Comparator*

During horizontal scanning, both the linear coil and the capacitance for S CURVE compensation must be adjusted to different values according to the frequencies, so IC705, LM339 comparator, is used in the circuit. The inverting input terminal of each comparator connects with the control point from the horizontal frequency to voltage converter while the non-inverting input terminal is set to a reference voltage in order to compare with the HV+. The higher the frequency is, the higher level of HV+ will be. When HV+ LEVEL is superior than the reference voltage, the output will be at LOW LEVEL. The reference voltage values of IC705/B, IC705/C and IC705/D are presented as below :

IC705/B : 43 KHZ
IC705/C : 51.5 KHZ
IC705/D : 62.5 KHZ

ξ *H-Parabolic Waves Generating Circuit*

The generation of the horizontal parabolic waves is described as the following :

The input signal from the AFC of W101 is sent to the horizontal sawtooth generating circuit that is composed of Q511, R516 and C509 through Q506, which works as a buffer. The saw-toothed waves are through Q508 that acts as a buffer to IC501/D, C514 and R539 to generate the corresponding parabolic waves. The parabolic waves are amplified to be about 14 Vp-p after passing through IC501/C, Q510, Q509 and R532. The amplitudes of the parabolic waves will change when the horizontal frequency changes. In order to make sure the amplitudes of the output to be stable, we sample from the pin 14 of IC501/D via a half wave rectifier that contains IC501/A and D507. IC501/B, R525 and R528 are for amplifying and rectifying the voltage to control the base of Q507 such that we can change the amplitudes of the saw-toothed waveforms, therefore, we are able to maintain the amplitudes of the parabolic waves to be the same at all times.

6.2 Main Board

ξ 12V, 5V, -5V, -0.4V Voltage Regulator Circuit

W702 is an input terminal of the power supply. The input 24VDC is converted to 12VDC by the regulator circuit that is combined with R757 and IC706. The 12VDC provides the power supplies for other circuits on the MAIN BD and parts of circuits on the POWER BD. On the other hand, the power supply for the -5VDC voltage regulator circuit is from the -7VDC of W702. IC202/B, Q706, R764, R763 forms the -0.4VDC voltage regulator circuit, which power supply is provided by the -5VDC and +5VDC.

ξ Vertical Deflection System

IC201, being the main part of the vertical circuit, composes of OSC, PRE-AMP and Driver O/P. This circuit is typically a vertical application circuit. Pin 3 is for oscillation where ZD201 is used to change the oblique of the oscillator, in order to allow the oblique to increase smoothly. In the circuit, the vertical linear adjustment is at VR201 while vertical height adjustment is at VR203. R208, the damper resistor, is used to decrease the Q value of the V-DY to avoid the oscillation. Both R207 and C209 are for filtration of HF noise. R201, C211 and R212 for AC feedback while R211 and R212 for DC feedback are used to stablize the features of the amplifier. D203 and C205 constitute a Boost circuit to provide 2-fold B+ voltage during the retrace period, therefore, the time required for retrace is cut down to save the power consumption.

There are two ways for external adjustment of the V-Size. The reference voltage supplied by aforesaid VV+ is used for presetting the V-Size while IC202/A and Q201 function to change the value of the sink current along according to the Vertical Frequency to correct the V-Size. In addition, the V-Size is changed by CPU which sents different Level to the base of Q202. Consequently, the change of sink current controls the V-Size. The external adjustment of the V-Pos is achieved by changing the DC level at V-DY that depends on what degree IC203/B conducts. However, the working condition of IC203/B, which changes the bias of Q203 and Q204, is determined by the vertical output.

ξ *Pincushion Circuit*

The deflected sawtoothed waves, which IC201 generates, are transmitted to the parabolic wave generating IC, IC905. The input of IC905 is the pin 3. The input with different LEVEL will cause the corresponing phase shifts of the parabolic waves. Consequently, adjusting VR902 can change the phase of the parabolic waves. The pin 12 outputs a parabolic wave with the vertical frequency. IC902/B acts as the buffer that makes the parabolic waves be able to drive the next stage of circuits. During the retrace time, there exists a pulse in the produced parabolic waves. Since this pulse will cause a defective condition in the Horizontal Deflection Circuit, we need to remove this pulse. We solve this problem by using IC902/C to produce a DC LEVEL to bias the parabolic waves. We can adjust different DC LEVEL by tuning VR903.

ξ *Pulse Width Modulation (PWM) Circuit*

Since the Horizontal Deflection Circuit is made up by diode modulation circuit, it is necessary to change the pincushion modulation to the pulse width modulation (PWM) as our control method.

The rectified parabolic waves, generated by IC905, are fed to the non-inverting input terminal of IC904 and act as the reference point of the pulse width modulation. On the other hand, the circuit that contains C916, R956, Q912, C920, R955, Q913, Q902, R911, D902, C901, R960, R958, R959, Q917 and the pin 8 of IC905 will generate the saw-toothed waves with the horizontal frequency. These saw-toothed waves are submitted to IC904 to compare with the parabolic waves with vertical frequency at the pin 2 and output the pulse modulated waves. Let us study the control of the width of the pulses. A controllable DC LEVEL from CPU is sent through IC901/A and IC901/B to adjust the range of DC LEVEL. The circuit, composed of Q901, R947, C914 and D901, is applied to clamp the amplitudes of the saw-toothed waves to control the width of the pulses, In other words, we are able to adjust the width of the horizontal size.

ξ *Pincushion Compensation Circuit for Parallelogram*

Since the deflection pincushion compensation circuit can only makes the symmetric adjustments for trapezium, pincushion and barrel distortions, we need to improve the distortions, caused by parallelogram and to keep the phase between each side to be same. So, we implement these by an extra circuit. We let the vertical parabolic waves pass to the amplifier circuit , composed of R235, R236, C221, Q207, R239, VR204 and R240. Adjusting VR204 can make the output to

be either positive or negative. At the same time, the vertical saw-toothed waves from the Vertical Deflection Circuit are also fed a amplifier that contains R228, C220, Q206, R231, VR205, R232, R242 and Q208 where VR205 can be tuned to obtain a either positive or negative output. At that moment, the adjusted parabolic waves will compose with the saw-toothed waves after passing through Q208. Afterwards, the composite wares will be sent to the pin 6 of IC101. Consequently, we can adjust any direction of the pincushion.

ξ DC to DC Loop Circuit

To ensure a stable high voltage working under different frequencies, we need different voltage supplies. DC to DC loop circuit is required to change voltage supply that depends on the frequencies.

A sample signal is fetched from the Horizontal Drive Circuit. The circuit that consists of C141, Q120, C140, R190, Q121, R191, Q122, R194 makes the sample signal be a about 3-us delayed trigger signal first. And then the signal is sent to trigger IC104,LM555. R156, C142 and the DC LEVEL of IC104's pin 5 result the horizontal duty cycle of the output for the HIGH LEVEL to be fixed. Q114, Q115, C145, T102, C146, R159, ZD105, Q116 are applied for switching the 190V voltage from the output of the Power BD circuit. When it is at HIGH LEVEL, Q116 will be ON that arises its output to be 190V voltage. In Contrast, it will be open at LOW LEVEL. The circuit, composed of D116 L105, C147, functions as a filter. Therefore, different DC LEVEL that depends of frequencies will be sent to FBT circuit. However, the voltage supply required by FBT and its different loads will cause changes in the Hi-voltage. So, we take a DC voltage from the pin 9 of FBT circuit to feed back the pin 6 of IC105/B via R172, VR105, R171 to compare with the reference point of IC105/B's pin 5. The output from the pin 7 of IC105/B will be sent to the pin 5 of IC104 via R162 to change the DC LEVEL that changes the HIGH LEVEL period of the output of IC104. ZD108 keeps the voltage of IC105 's pin 7 under a limitation that prevents the horizontal transistor from being destroyed by the excessive Hi- voltage. When we switch on the machine, all circuits will be under an unstable condition. R157, D114, C144, Q112 assemble together to make up a protective circuit. This circuit lets the DC LEVEL of IC104's pin 5 rise gradually that makes the Hi-voltage also increase gradually. ZD701, R768, R769, Q711, R770, R771, Q712 and R772 prevent the horizontal transistor from being destroyed by the unstable state, caused by switching off the machine. They make the Hi-voltage drop down quickly after turning off the machine.

ξ *Horizontal Deflection and Diode Modulation (PWM) Circuits*

The horizontal drive signal from the output of IC101 is sent to C120, Q107, T101, R160, R179 to drive the horizontal deflection transistor Q109. However, it is necessary to have a different drive current when the width of the horizontal size changes. So, the DC LEVEL of the H-Size, which the CPU controls, is applied to control the voltages across R133, R134. IC106/A amplifies the DC GAIN. Q108 functions as a voltage regulator to supply the operating voltage for the drive circuit. C134 and H-DY construct the LC oscillation for the horizontal deflection circuit while Q109 and D108 act as switches. H-DY produces a current that is either positive or negative. Since H-DY is a coil, when a current flows across it, a magnetic field will be generated. The generated magnetic field changes the flowing direction of the electronic beams of the CRT. In addition, the LC oscillation circuit also includes D109, C137, L104, L106, D108, Q109, D108 as well as the FBT transformer. The supplied voltage from D109, C137 , L104 and the supplied voltage from D108, H-DY, C134 generate a voltage difference between H-DY and C127. While the PWM circuit changes its being ON period, it also changes the voltages of D109, C137 and L104. So, the voltage difference between H-DY and C127 can be adjusted. This voltage difference changes the currents of H-DY that changes the deflection magnetic field, therefore, the size of Horizontal Size can be adjusted at that time. On the other hand, while Q109 is off, C134 discharges that produces an about 940Vp-p pulse at the collector of Q109. The pulse generate a magnetomotive force in the Pin 3, 2, 1 of the FBT transformer. Thus, different amplitudes of pulses will be produced at the primary and secondary coils of the FBT transformer. So, different DC voltages can be generated. However, the horizontal deflection current may have a horizontal linear problem caused by different frequencies and the curve of the current. In order to compensate the horizontal linearity, different situations match different frequencies. Under 43kHz, Q111, RL101, Q119, and Q110 will be conducted. At the same time, C127, C129, C130 and C156 are all in parallel that forms the equivalent capacitance Cs. L102 will be the equivalent linear coil. When the frequency is between 43KHz and 51.5KHz, Q111 and RL101 will be off. Moreover, the equivalent capacitance Cs will equal to C127, C130 and C156 in parallel. The equivalent linear coil will be L102 and L103 in parallel at that time. When the frequency is over 51.5KHz but under 62.5KHz , Q111, RL101 and Q110 will be off. CS equals to C127 and C156 in parallel while the linear coil equals to L102 and L103 in parallel. When the frequency is over 62.5KHz, CS equals to C127 and the linear coil still equals to L102 and L103 in parallel. In conclusion, the higher the frequency is, the lower the equivalent linear coil and Cs will be.

ξ ABL Circuit & Dynamic FOCUS Circuit

ABL Circuit

The ABL circuit is used to limit the VIDEO amplitude when the brightness of the VIDEO is over the current specification of the CRT. When the brightness of the CRT increases, the current of the Hi-voltage load will also goes up. At the same time, the current that flows through R501 and C501 will also increase so that the voltage of R501 becomes higher. When the voltage difference between the base and the emitter of Q501 gets enough large, Q501 will be ON. Afterwards, the emitter voltage of Q502 decreases as the voltage across R502 goes down. Since the emitter of Q503 is connected with the control points of VIDEO GAIN, the DC LEVEL is lowered that controls the gain of the VIDEO and makes the brightness energy be stable and then CRT current no longer increases.

Dynamic FOCUS Circuit

The Dynamic FOCUS Circuit is applied for the compensation of the four corners, caused by the insufficiency of the FOCUS voltage. The horizontal parabolic waves, taken from the SYNC BD, and the vertical parabolic waves, produced by IC905 are gathered to be amplified and sent to the FBT transformer to compensate the FOCUS voltage. After passing through C517, R538 and T501, the amplitudes of the horizontal parabolic waves will be amplified up to about 15 times. Afterward, they will be sent to the output of the amplifier circuit for the vertical parabolic waves to synthesize a modulating parabolic waves, in which the vertical parabolic waves as the envelope while the horizontal parabolic waves as the carrier. The vertical parabolic waves are AC coupled to the base of Q911 from C909. Q911 functions as an inverting amplifier.

6.3 Video Board

ξ Video Pre-Ampifier

The major function of IC401, the pre-amplifier, is to amplify the analog video that is 0.7Vp-p to TTL Level signal before further process. For the video ,there are three channels that are R, G and B, respectively. Since these channels have the same configuration, the following description will only cover the green signal. The green video signal couples to IC401 via C403. The clamp signal, which is taken from the H-sync in the Sync Process Circuit, is amplified inversely by Q401 and transmitted to the pin 14 of IC401 for clamping. The pin 12 is for the video gain control. After the output passes through D403 to Q417, which is an emitter follow, it will be transmitted to next stage.

ξ Video Output System

The green video signal, amplified by the Pre-amplifier, is transmitted to Q418, Q419, Q420 and Q421 for further amplification to drive the CRT. R458 and C433 compensate the fall time of the video. The output signal couples to the cathode (CRT) through C435 while adjustment of VR406 can regulate the video bias. Q402, Q403 and Q404 assemble a circuit for H-Blank rectification. Such blanking signal is transmitted to the amplifier's emitter of each R, G and B gun for blanking.

6.4 Power Board

ξ Power Supply Operating Theory

1. The power supply of DX17F is an off-line fly-back type switching power supply. The line input is 90~132Vac or 180~264Vac auto-selectively. There are totally 4 major outputs: 190Vdc, 85Vdc, 24Vdc, 5Vdc, -7Vdc, in which 190Vdc is the major one. The total output power is 90W approximately.
   The maximum loads of the outputs are:

190Vdc	3A
85Vdc	0.1A
24Vdc	0.5A
5Vdc	0.3A
-7Vdc	1A

2. Input rectifier & filter:
   (a) EMI line filter, which consists of T302, T303, C337, C336, C335, C301, performs to reduce the electromagnetic interference.
   (b) TH302 reduces the surge current.
   The basic block diagram of DX17F power supply operation is shown as below:
   (c) When input voltage is in 90~132Vac range, the 115/230Vac auto-selective circuit makes the ac line charge C301 and C302 through 2 diodes (D301 and D304) of the bridge diode, showed as in figure 6.1.

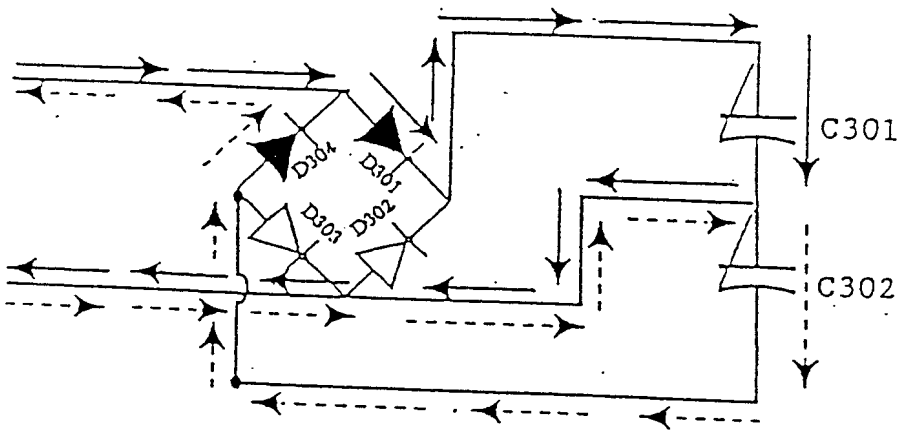


Figure 6.1

(d) When the input voltage is in 180~164Vac range, the 115/230Vac auto-selective circuit makes the loop bridge rectified. It is a standard full wave rectifier then, showed in Figure 6.2.

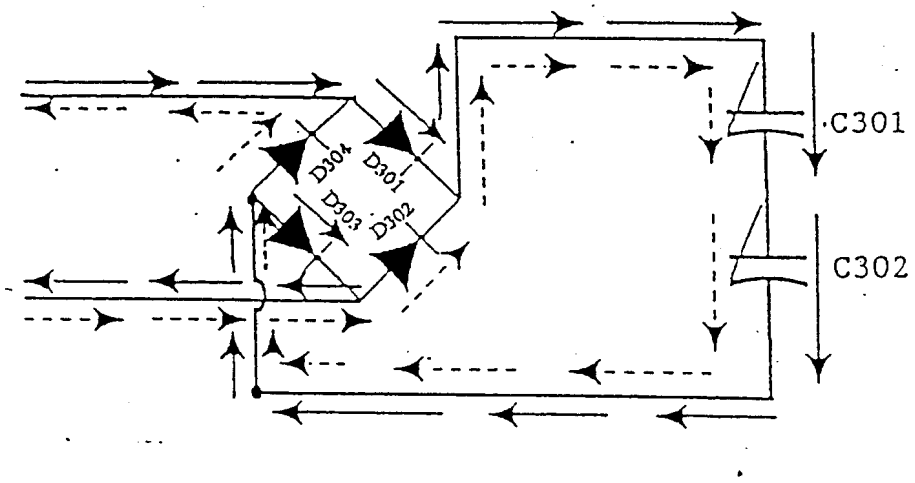


Figure 6.2

3. 115/230Vac auto-selective circuit: This circuit checks AC input voltage in either 90~132Vac or 180~264Vac. Then it determines IC304 to be at "ON" or "OFF" state. If the input is in 90~132VAC range, IC304 will be "ON" and the result is described in 2-(c). If the input is in 180~264Vac range, IC304 will be "OFF" and the result is described in 2-(d).

4. High frequency converter: it consists of T301, Q301,...,etc. The fly-back converter (T301) stores energy in the primary winding as Q301 is ON. On the other hand, it dumps into the secondary winding as Q301 is Off.

5. Output rectifier & filter: its configuration is shown in Figure 6.3.

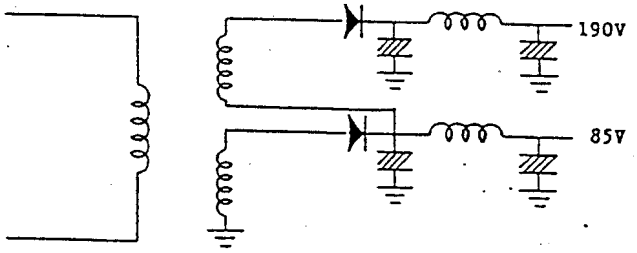


Figure 6.3

6. Feedback circuit: tuning VR301 can adjust the 190Vdc output voltage. The opto-coupler IC302 is applied to couple the feedback signal from the output duty cycle to IC301. Thus, it stablizes the output voltage.

7. Control circuit: the major component is IC301 which is a P.W.M. IC.
   (a) The feedback signal is sent to IC301 to control the duty that stabilizes the output voltage.
   (b) R319, C315 control the frequency of IC301 during unsync. With sync signal, the frequency of the IC301 must be higher than the free run frequency of IC301.
   (c) Short or overload protection: It consists of R311, R312, C305, IC301's pin 3, etc. They are grouped as a current limited circuit. When the output is overloaded or shorted, the current of the primary winding of T301 will be increased considerably that makes the peak voltage of R311 also increase. This increased voltage runs through R312 to the pin 3 of IC301. When it amounts over 1V at the pin3 of IC301, IC301 will turn OFF that makes the output be OFF accordingly.

8. Degaussing circuit: It is composed of RL301, TH301, C320, R334, R339,... etc. When the power switch is ON or the degauss switch is pressed, the degaussing circuit will be active for about 4 seconds.

9. 5V voltage generated circuit: It contains T060, IC060, R068, VR060 and D064, where VR060 can adjust the error term of the output voltage. The generated 5Vdc provides the power supplies for the HV+ and VV+ circuits of the SYNC BD., the digital processor and control system circuit of the MAIN BD. as well as the power supply for the -0.4Vdc voltage regulator circuit.

ξ *Power Saving Operation*

There are three modes of Power Management of DX17F when the power is switched on. They are **On Mode, Suspend Mode** and **Off Mode**, respectively. The control signals from the CPU are transmitted to the power saving system to determined which mode the monitor adopts. Control signals A and B are from the IC001 pin 30 and pin 31, respectively. We will discuss these three modes separately.

On Mode

When it is On mode, both control signals A and B will be HIGH. D066 and D067 act as an And Gate that makes the pin 1 of IC061 be HIGH at that moment. The pin 2 of IC061 will be LOW then since it is an inverted IC. The LOW of the pin 2 makes both the pin 4 and pin 6 be HIGH that drive both Q064 and Q065 to be ON. Q063 and Q066 operate as switches that Q063 will be ON at that Mode

while Q066 will be OFF as the collector of Q065 is LOW at that time. The LOW of the pin 2 also connects to the pin 11 that will control the color of the LED indicator to be green then. On the other hand, D071 and D072 operate as an Or Gate that makes Q068 ON and the collector will be LOW that makes IC062 will be OFF then. Consequently, the monitor works normally.

Suspend Mode

When the Suspend Mode is activated, either signal A or B will be HIGH. As we mentioned above, D066 and D067 form an And Gate that makes the pin 1 of IC061 be LOW then. As a result, Q063 will be OFF that cut down the 24V power supply. Moreover, Q066 will be ON that will drag down the HI-voltage. D071 and D072 combine as an Or Gate will control the IC062 be OFF just as the On Mode. The LED indicator will become yellow in color that is controlled by the state of the pin 8 which is at HIGH then. The monitor will power down and the maximum power consumption the this mode is 30W.

Off Mode

When the Off Mode is active, both signals A and B will be LOW. Since the operations of Q603 and Q066 will be the same as the Suspend Mode, we are not going to discuss here. However, the base of Q068 will be at LOW then since signal A and signal B are LOW. As a result, IC062, which connects with the pin 1 of IC301, will be ON that affects the control circuit of the power supply. Besides this, As C069 charges and discharges through R077 periodically, the LED indicator will not only remain yellow in color but also flash. The maximum power consumption of the Off Mode is under 5 W.

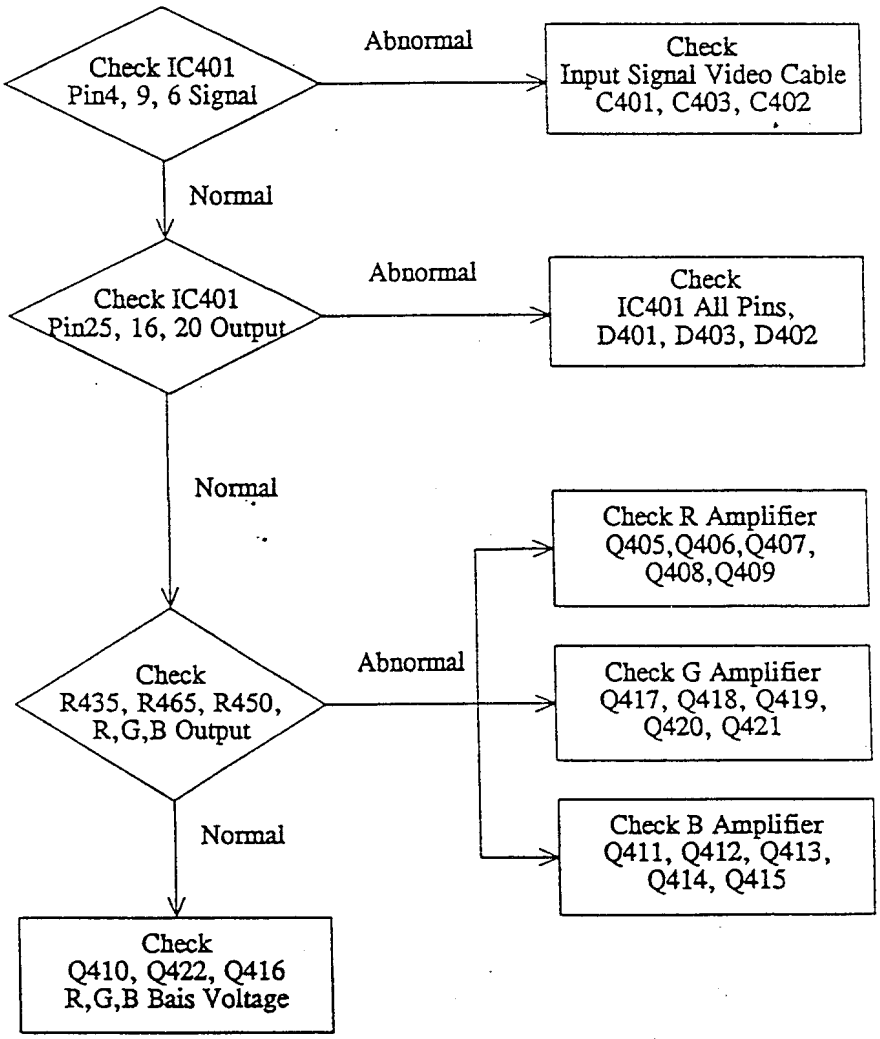
In order to have a clearer view of the power management of DX17F, several crucial points' states will be showed in TABLE 2.

mode	*A*	*B*	*IC061 pin1*	*IC061 pin4,6*	*Q063*	*Q066*	*The base of Q068 and Q067*	*IC062*	*Power Led*
On	HIGH	HIGH	HIGH	HIGH	ON	OFF	HIGH	OFF	green
Suspend	LOW	HIGH	LOW	LOW	OFF	OFF	HIGH	OFF	yellow
Suspend	HIGH	LOW	LOW	LOW	OFF	OFF	HIGH	OFF	yellow
Off	LOW	LOW	LOW	LOW	OFF	OFF	LOW	ON	yellow with flashing

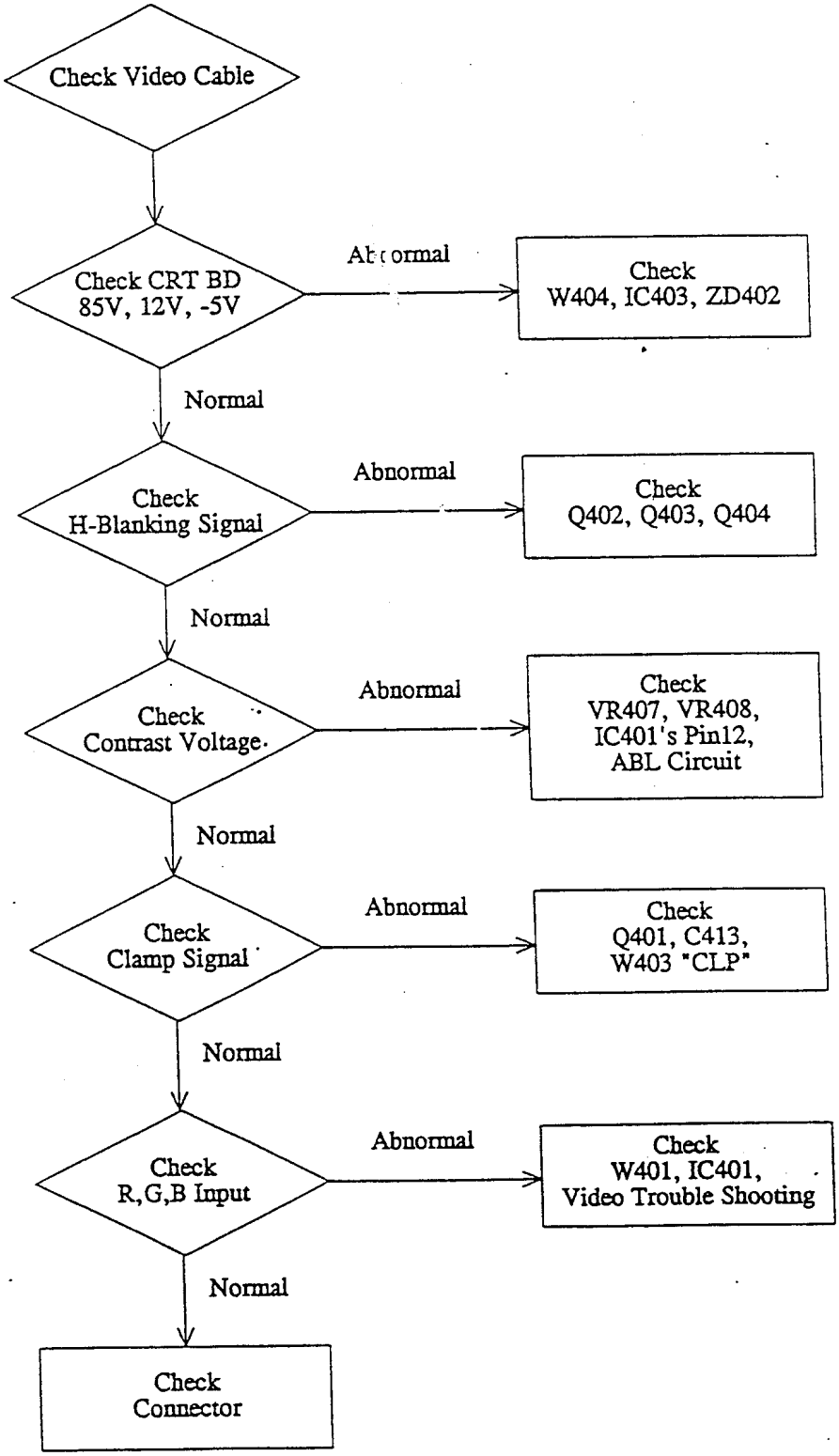
TABLE 2

7. Trouble Shooting Guide

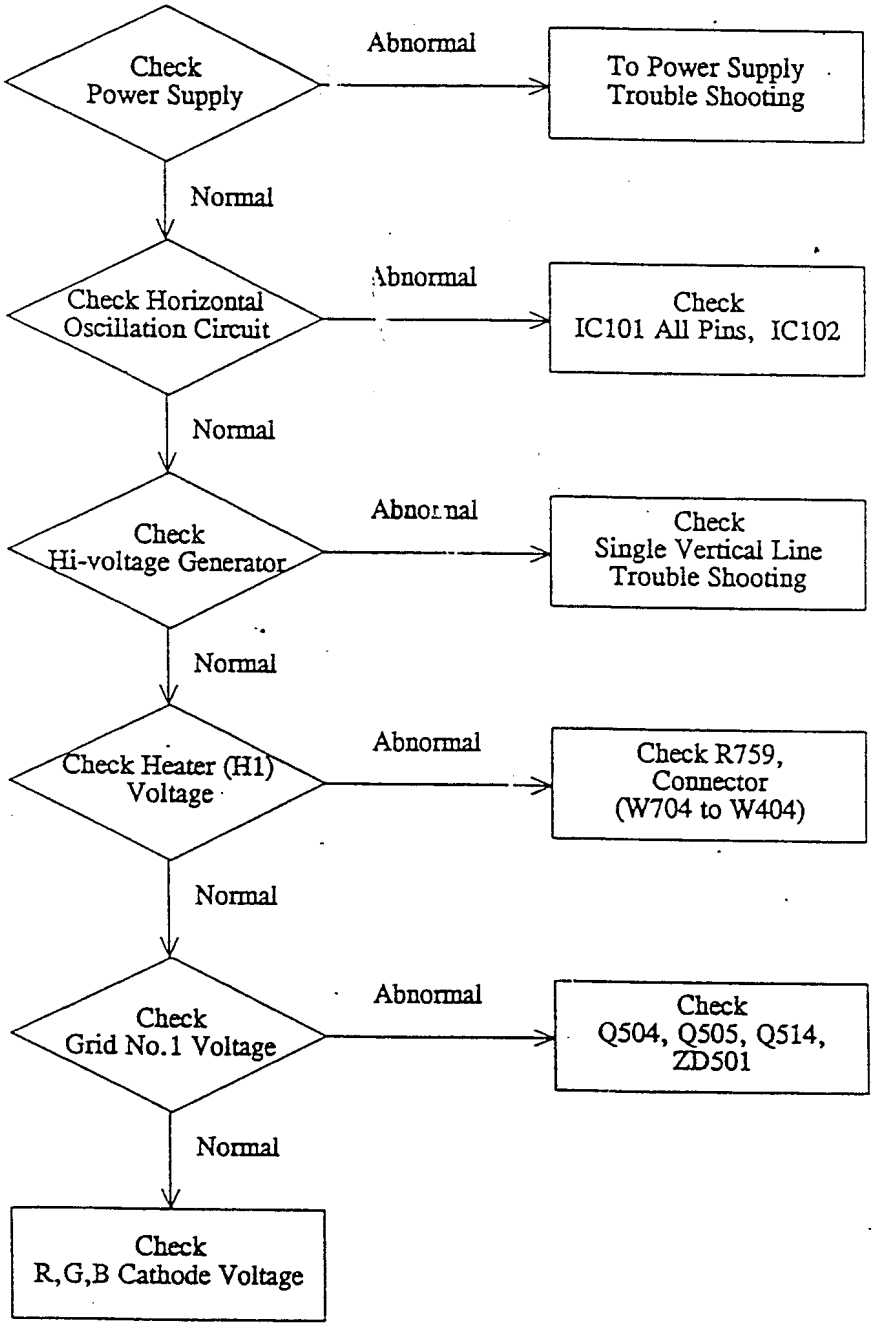
Video no R, G, B color



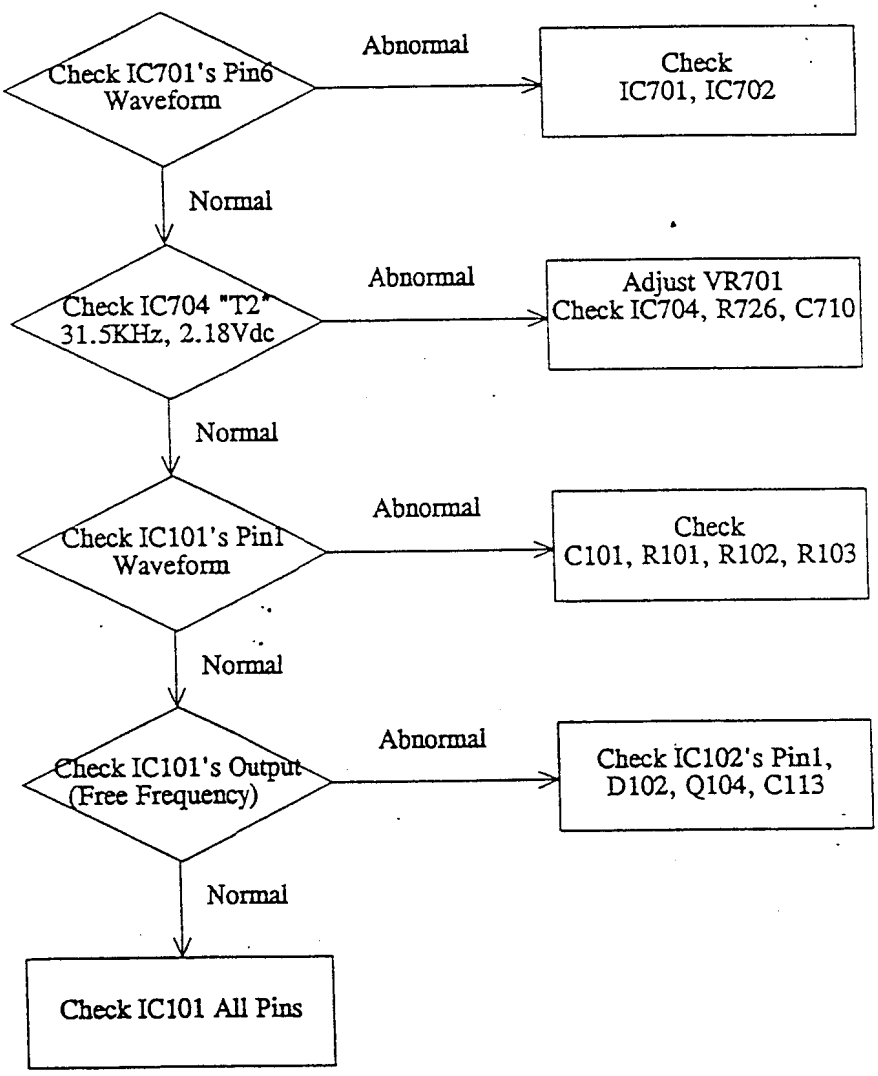
Video does not appear



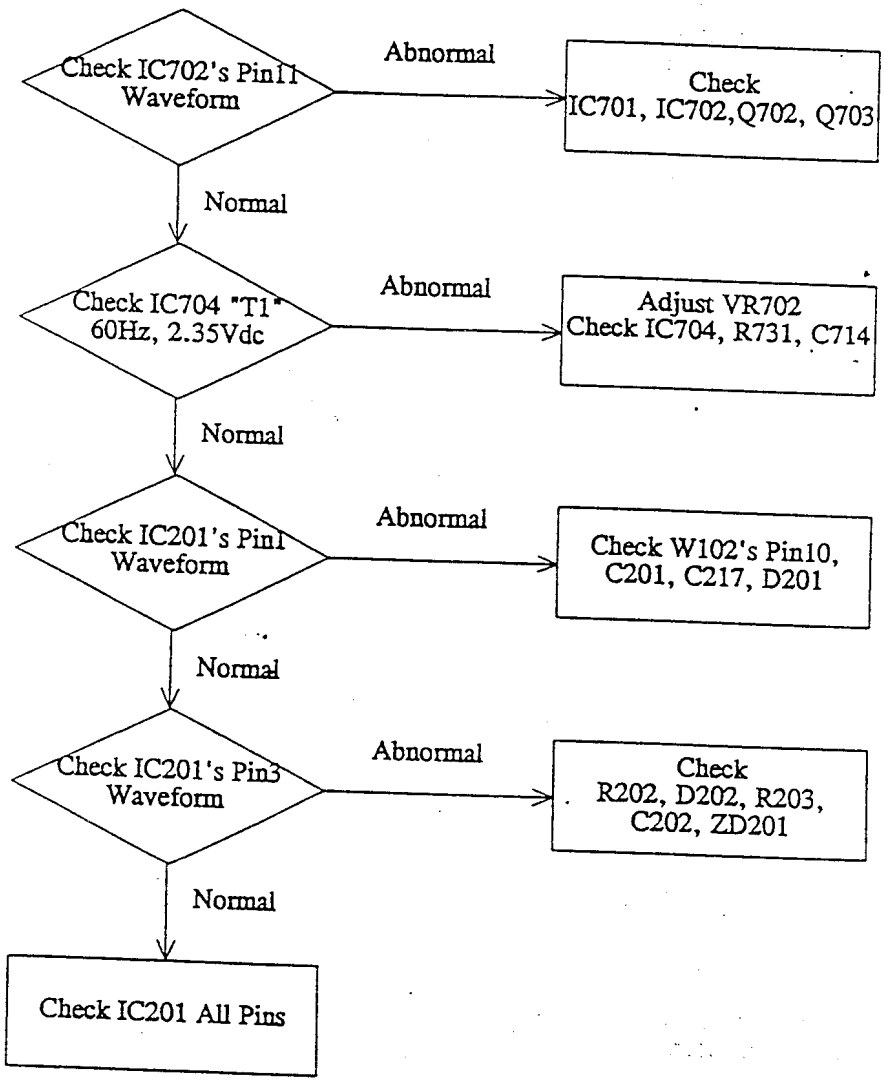
Raster does not appear



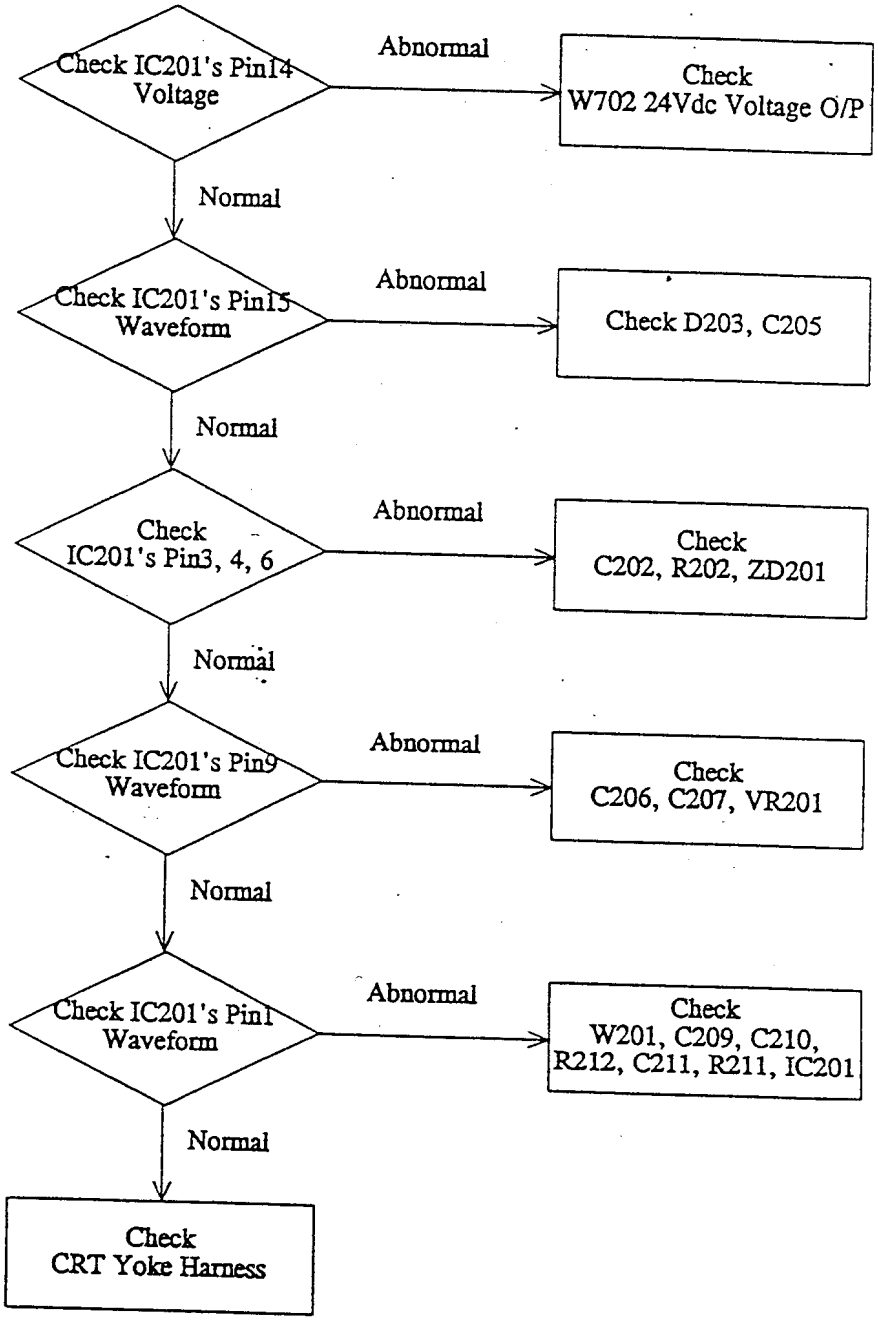
Horizontal cannot synchronize



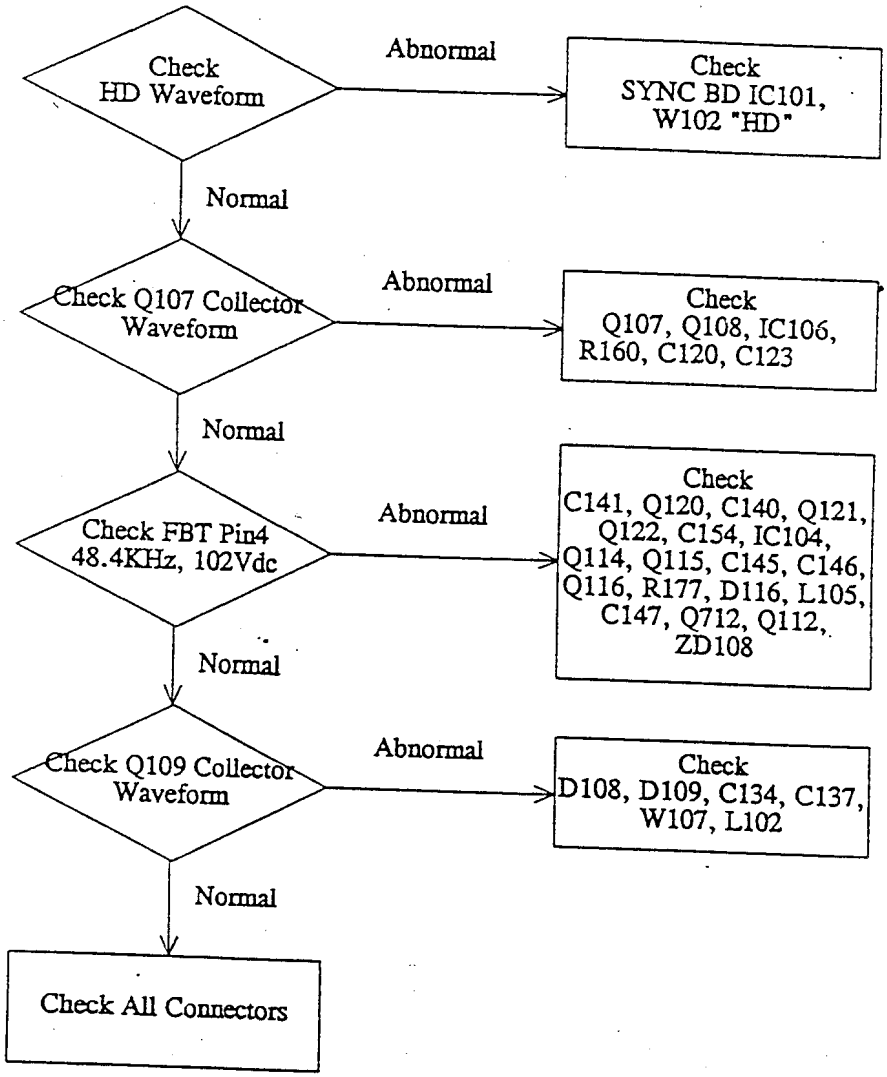
Vertical cannot synchronize



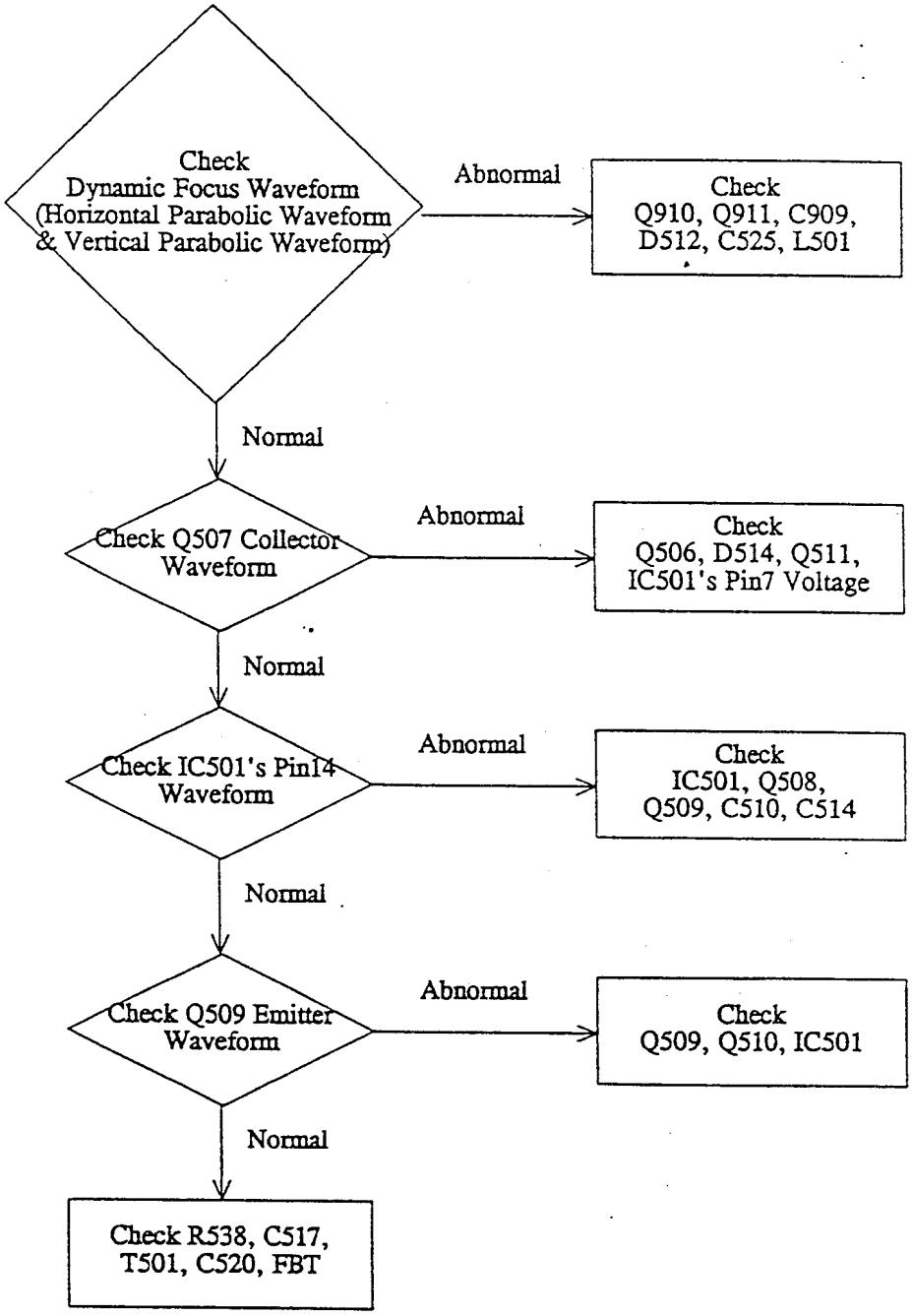
Single Horizontal Line



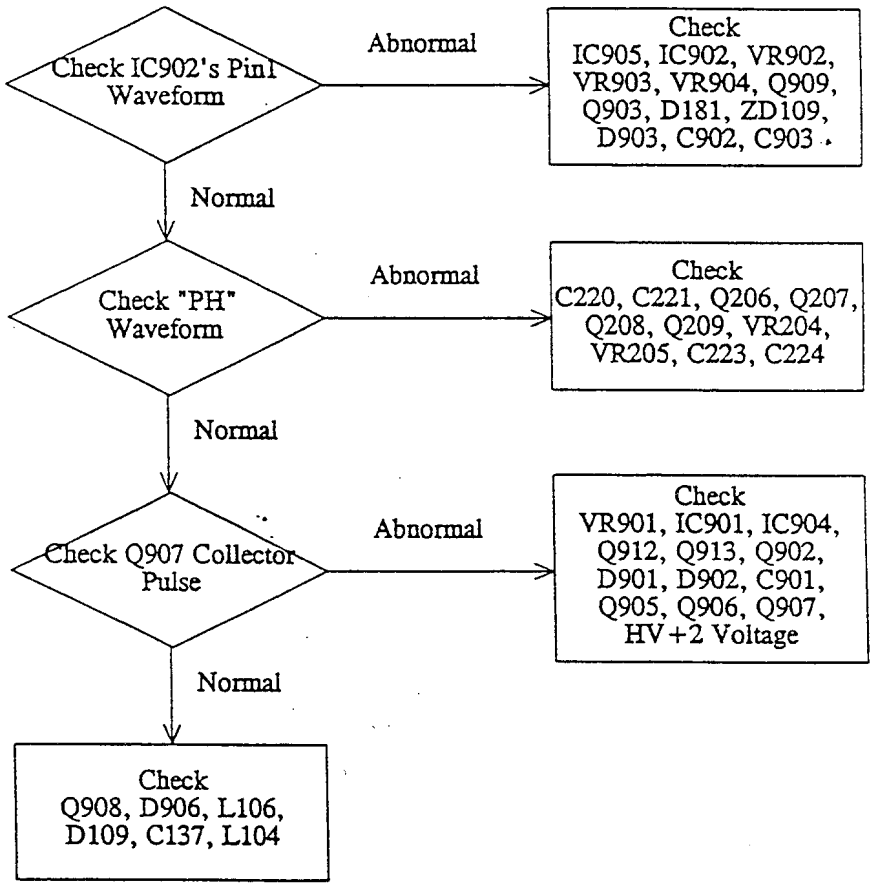
Single Vertical Line



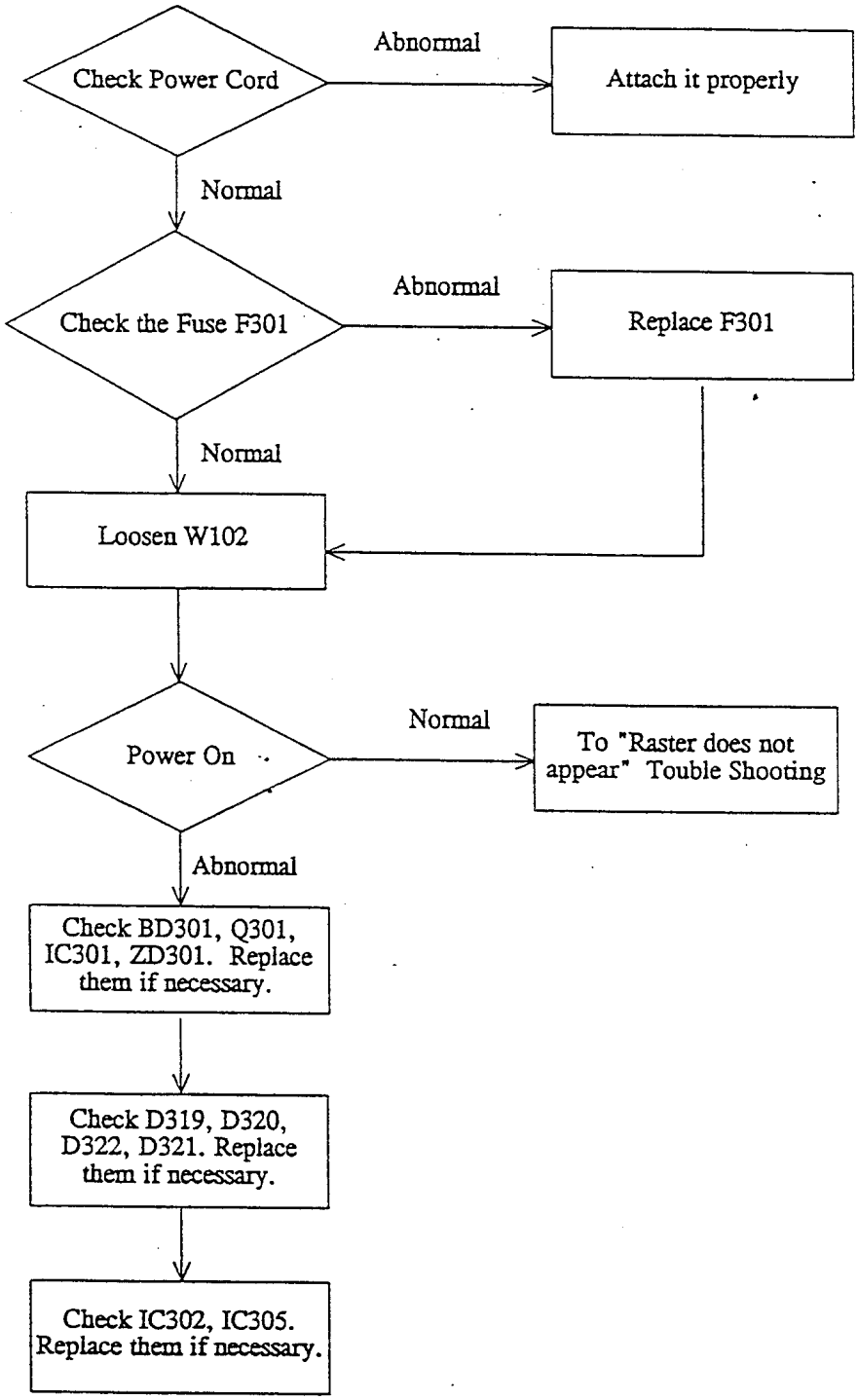
Dynamic Focus Fair



Pincushion & Distortion


Check IC902's Pin1 Waveform
Abnormal
Check IC905, IC902, VR902, VR903, VR904, Q909, Q903, D181, ZD109, D903, C902, C903
Normal
Check "PH" Waveform
Abnormal
Check C220, C221, Q206, Q207, Q208, Q209, VR204, VR205, C223, C224
Normal
Check Q907 Collector Pulse
Abnormal
Check VR901, IC901, IC904, Q912, Q913, Q902, D901, D902, C901, Q905, Q906, Q907, HV+2 Voltage
Normal
Check Q908, D906, L106, D109, C137, L104

Power Supply



8. Detailed Alignment Procedure

- *Before making any adjustments, the monitor should be continually warmed up for 30 minutes.*
- *Before making any adjustments, the monitor should be orientated towards the East.*

1. Regulation of supplied voltage and Hi-voltage

Conditions : input - 110V ac without any video signal;
free run;
brightness control (on the front panel) - maximum;
contrast control (on the front panel) - maximum;

A. Regulation of supplied voltage

1. Adjust VR301, which is on the POWER BD., such that the voltage of 190V at W304 is in the range of 190V±0.5V dc.
2. Adjust VR703, which is on the MAIN BD., such that the test-point's voltage of +5V is in the range of 5V±0.02V dc.

B. Regulation of the horizontal frequency under FREE RUN

1. Dial VR101, which is on the SYNC BD., clock wisely to the maximum and set VR103, which is on the SYNC BD., at the mechanical center position.
2. Adjust VR102, which is on the SYNC BD., such that the horizontal frequency is in the range 24KHz ± 200Hz.

C. Regulation of Hi-voltage

1. Adjust VR105, which is on the MAIN BD., such that the voltage of the Hi-voltage anode is in the range of 29.5kV ± 0.3kV.
2. Adjust VR106, which is on the MAIN BD., such that the operating point's voltage of X-Ray protection is 29.5kV.
3. Adjust VR105 such that the voltage of the Hi-voltage anode is in the range of 27kV ± 0.3kV.

2. *Regulation of the Normal Display*

Conditions : contrast control(on the front panel) - maximum;
brightness control(on the front panel) - maximum;

A. Frequency to Voltage Regulation

1. Input the 640 x 480 mode with Hor-frequency = 31kHz and Ver-frequency = 60Hz.
2. Adjust VR701, which is on the SYNC BD., such that the voltage of T2 is in the range of 2.18 ± 0.02V dc.
3. Adjust VR702, which is on the SYNC BD., such that the voltage of T1 is in the range of 2.35 ± 0.02V dc.

B. Horizontal Hold Regulation

1. Input the 800 x 600 mode with full white pattern where Hor-frequency = 35.15kHz and Ver-frequency = 66Hz.
2. Use a wire connector to connect between ground (GND) and T3 to make it become a short circuit. Then, adjust VR701, which is on the SYNC BD., such that the picture is stable.

3. *Regulation of H-Center, H-Phase, H-Size, V-Position, V-Size and V-Linearity.*

Conditions : input - resolution : 1024 x 768;
pattern : cross hatch pattern;
Hor-frequency : 56.5kHz;
Ver-frequency : 70Hz;
contrast control(on the front panel) - maximum;
brightness control(on the front panel) - maximum;

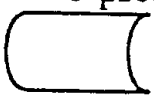
1. Switch downward the SW701 to the PRESET MODE and press once SW710 to restore the STANDARD MODE state.
2. Adjust VR104(H-Center), which is on the MAIN BD., such that the background of the picture is at the center of the front frame.
3. Adjust VR103(H-Phase), which is on the SYNC BD., such that the video picture is at the center of the front frame. Moreover, the phase difference between the left and right side of the display should less or equal to ± 4mm.(i.e.≤ ± 4mm)
4. Adjust VR901(H-Size), which is on the MAIN BD., such that the horizontal size of the display within the specification 300 ± 4mm.

5. Adjust VR201(V-Linearity), which is on the MAIN BD., such that the upper, middle and lower checks on the picture are with identical size.
6. Adjust VR203(V-Size), which is on the MAIN BD., such that the vertical size of the display within the specification 220 ± 2mm.
7. Adjust VR202(V-Pos), which is on the MAIN BD., such that the video picture is at the center of the front frame. Moreover, the difference between the up and down of the display should less or equal to ± 2mm.(i.e.,≤ ±2mm)

4. *Regulation of Geometric Distortion*

Conditions : input - resolution : 1024 x 768;
pattern : cross hatch pattern;
Ho-frequency : 56.5kHz;
Ver-frequency : 70Hz;

A. Fine Adjustment of the Geometric Distortion

1. Adjust VR904(PIN), which is on the MAIN BD., such that the pincushion and barrel between each side are under the specification.
   PIN ≤ 1.5mm
   BARREL ≤ 1.0mm
   Such adjustment can avoid the video picture from occurring distortions like
   and
2. Adjust VR902(Trapezoid), which is on the MAIN BD., to avoid the video picture from occurring distortions like
   or
3. Adjust VR205(Parallelogram), which is on the MAIN BD., to avoid the video picture from occurring distortions like
   or
4. Adjust VR204(with one side suffering from pincushion , the other suffering from barrel), to keep the video picture in balance. The location of VR204 is on the MAIN BD.. Furthermore, such adjustment can avoid the video picture from occurring distortions like
    or
5. Adjust VR903(Offset), which is on the MAIN BD., to avoid the upper part of the video picture from distortion like

B. Reconfirmation of H-Phase Regulation

Adjust VR103 again to make the video picture at the center of the front frame. At that time, the specification of the difference between both sides becomes $\leq \pm 2$mm.

C. Reconfirmation of H-Size Regulation

Adjust VR901 again to make the horizontal size within the range of 300 ± 2mm.

5. Regulation of White Balance and Brightness

Conditions : input - resolution : 1024 x 768;
pattern : central block pattern
Hor-frequency : 56.5kHz;
Ver-frequency : 70Hz;

A. Regulation of White Balance

(a) For the raster

1. Tune VR404, VR405 and VR406 clock-wisely to the bottom. The locations of these VRs are on the VIDEO BD..
2. Adjust the contrast control(VR408) to the minimum while the brightness control(VR503) to the maximum. Both the contrast control and the brightness control are on the front panel.
3. Adjust the SCREEN VR, which is on the FBT, such that the background is about 0.7FL. (i.e. the value of Y on the TV- color analyzer)
4. Adjust VR404, VR405 and VR406(by Addition) such that $x = 0.281 \pm 0.005$ and $y = 0.311 \pm 0.005$. The locations of these VRs are on the VIDEO BD..
5. Adjust the SCREEN VR again to make the background is about $0.7FL \pm 0.5FL$.
6. Check the values of x and y again to confirm the regulation where $x = 0.281 \pm 0.005$ and $y = 0.311 \pm 0.005$.

(b) For the gain

1. Tune VR401, VR402 and VR403 clock-wisely to the bottom. The locations of these VRs are on the VIDEO BD..
2. Adjust the contrast control(VR408) such that $Y = 7FL \pm 0.5FL$. Tune the brightness control(VR503) to the minimum.
3. Adjust VR401, VR402 and VR404(by Subtraction) such that $x = 0.281 \pm 0.005$ and $y = 0.311 \pm 0.005$. The locations of these VRs are on the VIDEO BD..
4. Then, tune the contrast control(VR408) and the brightness control(VR503) to the maximum.

5. Adjust VR407, which is on the VIDEO BD., the brightness of the center within the specification 45FL ± 2FL.

6. *Focus, CG Regulation*

A. Focus Regulation

Conditons : input - resolution : 1024 x 768;
pattern : cross hatch pattern;
letter "H" pattern;
Hor-frequency : 56.5kHz;
Ver-frequency : 70Hz;

1. Adjust the FOCUS VR(1), which is on the FBT, such that the horizontal lines of the patterns become clear.
2. Adjust the FOCUS VR(2), which is on the FBT, such that the vertical lines of the patterns become clear.

B. CG Regulation

Conditions : input - resolution : 1024 x 768;
pattern : cross hatch pattern;
Hor-frequency : 56.5kHz;
Ver-frequency : 70Hz;

(a) Statistic Convergence Regulation

1. At first, input the purple cross hatch pattern. Adjust the "four pole", which is on the CRT magnetic ring, such that the purple convergence is in compliance with the specification.
2. Then, input the white cross hatch pattern. Adjust the " six pole", which is on the CRT magnetic ring, such that the convergence is in compliance with the specification.

(b) Dynamic Convergence Regulation

Use magnetic pieces to improve the picture and make the convergence within the specification.

✞Note: During using a CG mirror to check the convergence, make sure that X, Y are kept upwards.

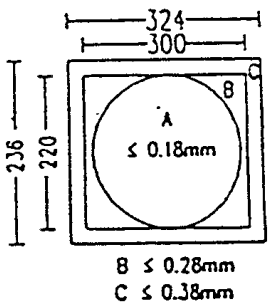


Figure 8.1

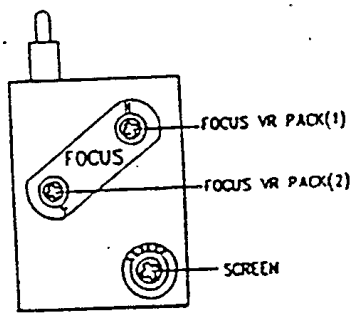


Figure 8.2

9. Measured Waveforms

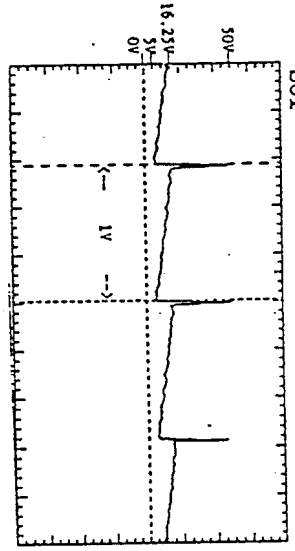
Test Conditions

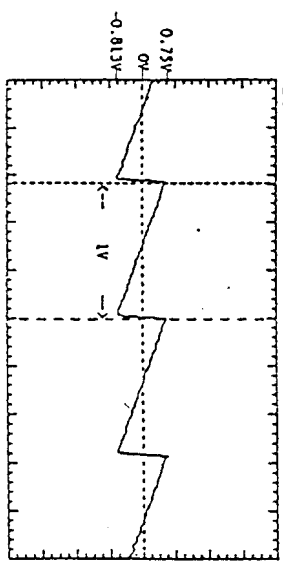
1H = Horizontal Frequency
= 56.476 kHz;

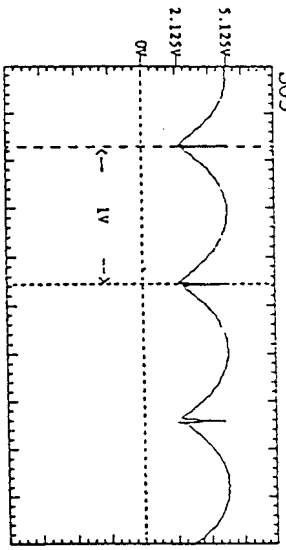
1V = Vertical Frequency
= 70.069 Hz;

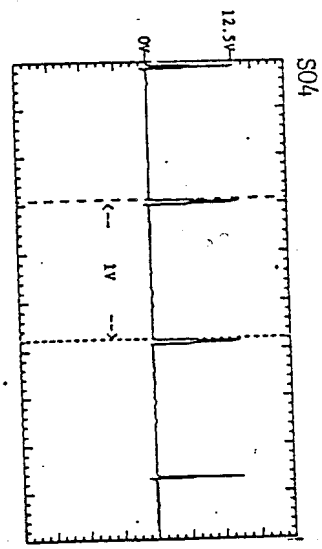
S36 ~ S45

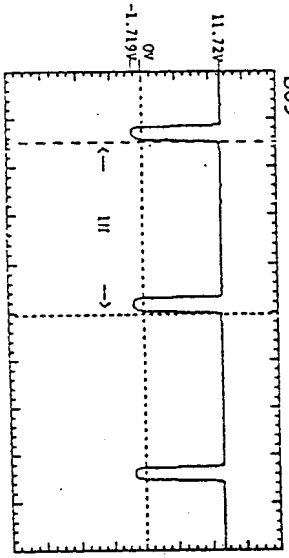
pattern : full white pattern

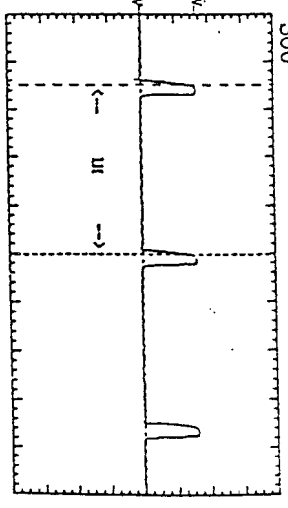


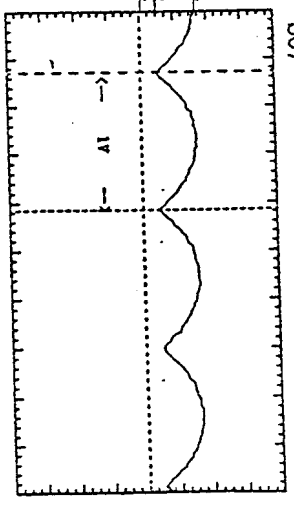


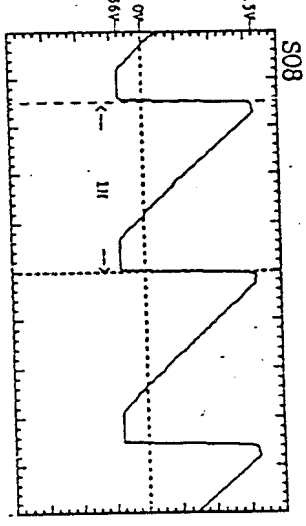


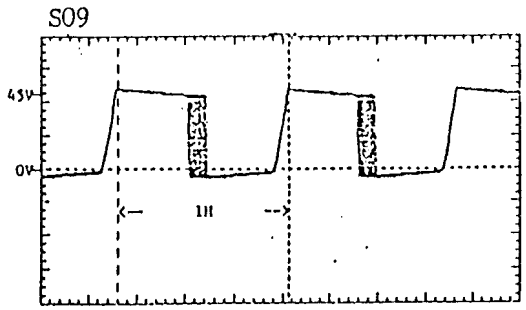


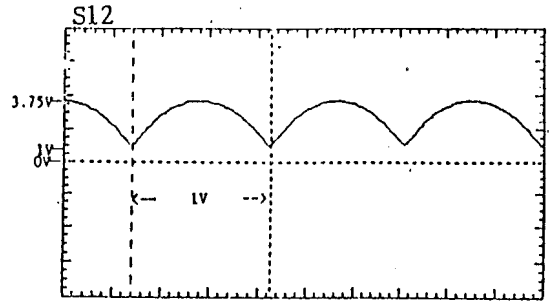


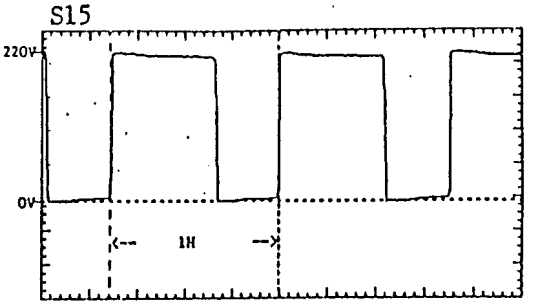


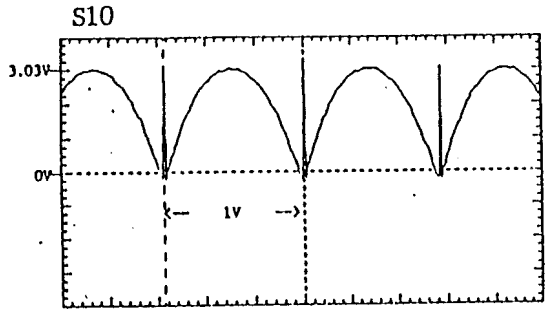


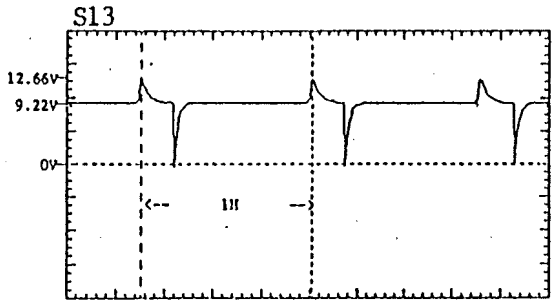


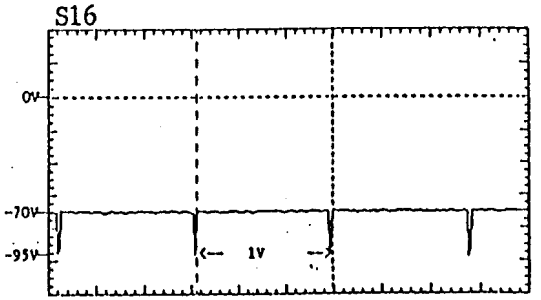

S09
45V
0V
1H

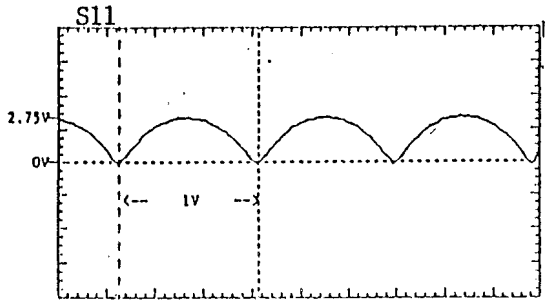

S12
3.75V
1V
0V
1V

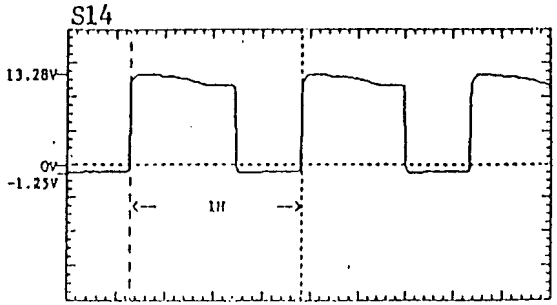

S15
220V
0V
1H

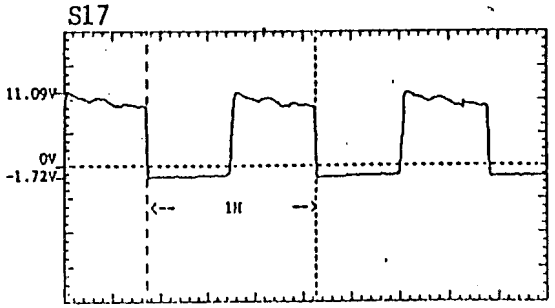

S10
3.03V
0V
1V


S13
12.66V
9.22V
0V
1H


S16
0V
-70V
-95V
1V

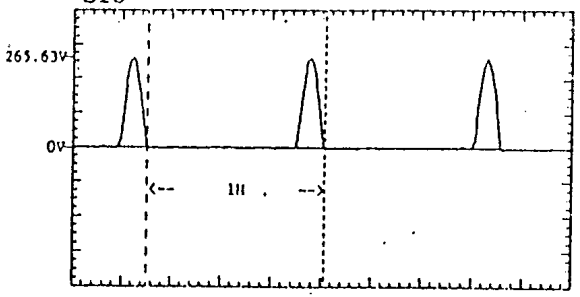

S11
2.75V
0V
1V


S14
13.28V
0V
-1.25V
1H

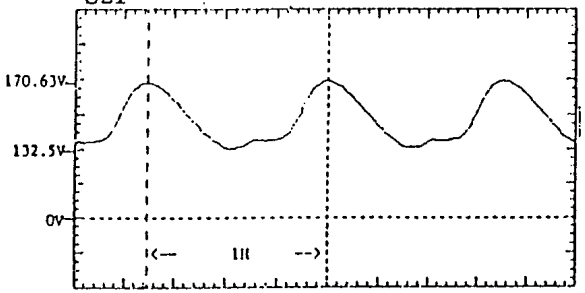

S17
11.09V
0V
-1.72V
1H

4i

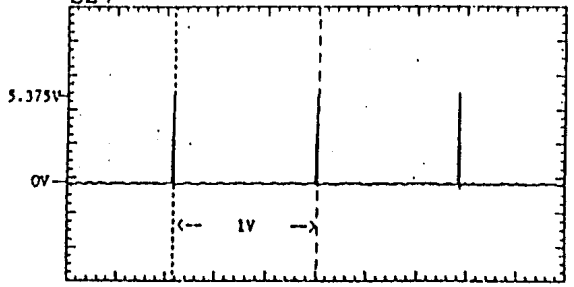
S18



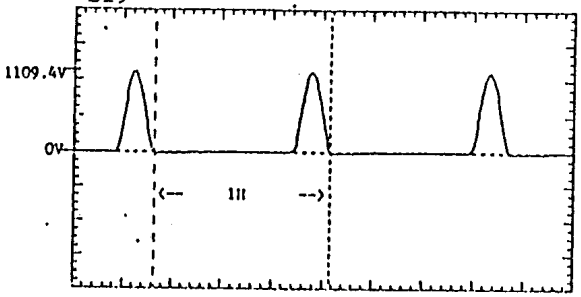
S21



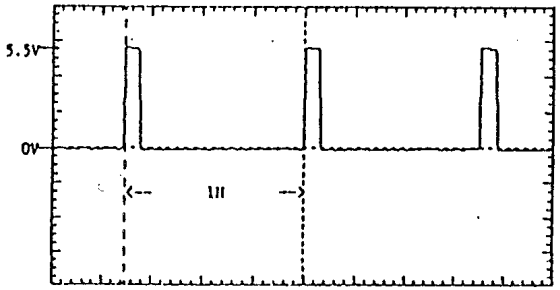
S24



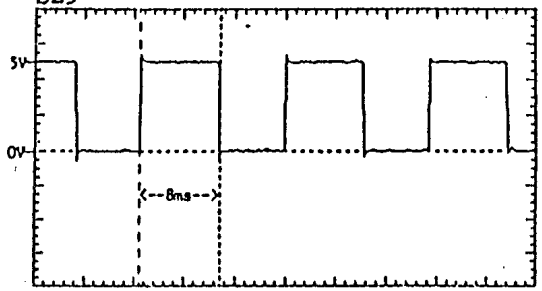
S19



S22



S25



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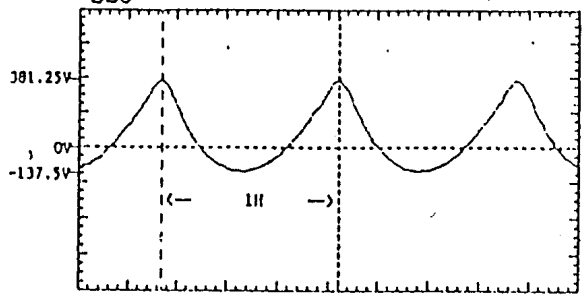

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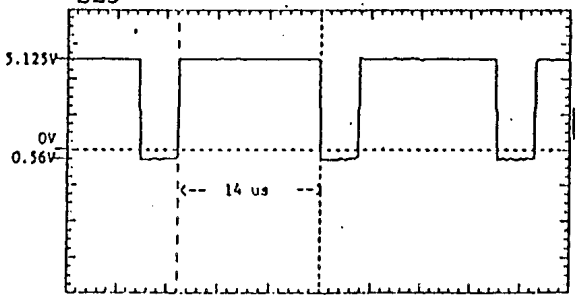

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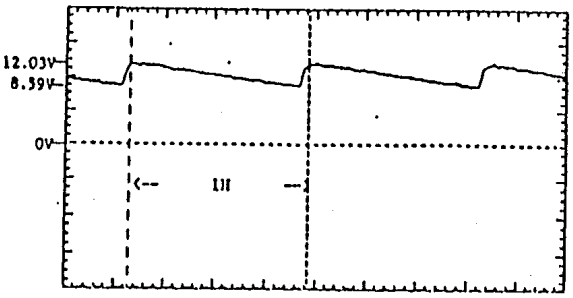

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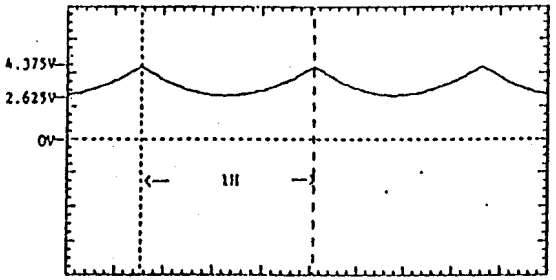
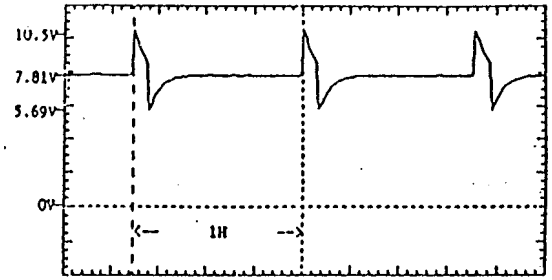


S30



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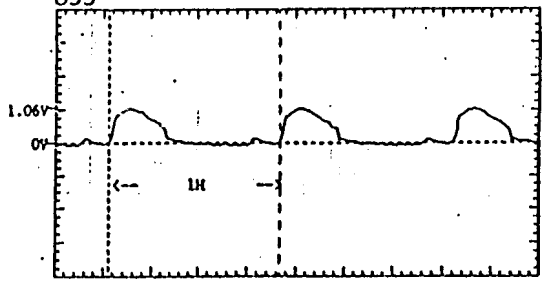

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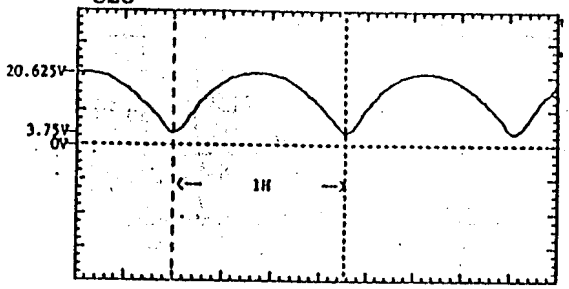

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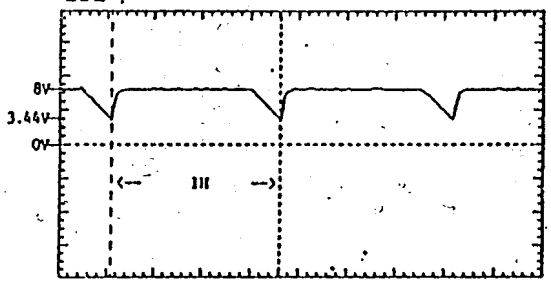

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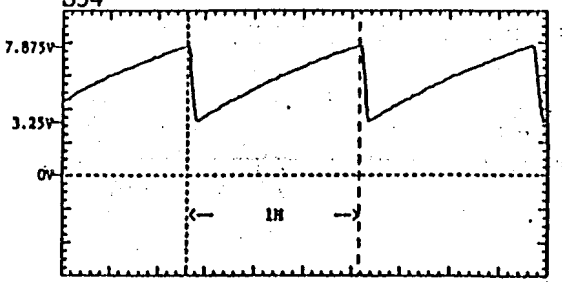
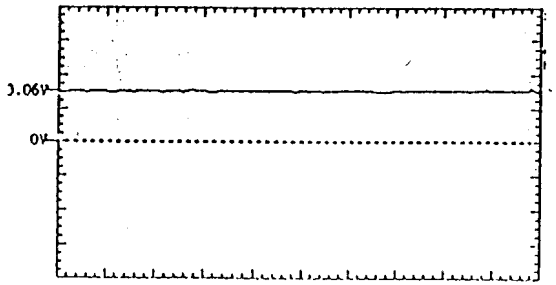


43

S29



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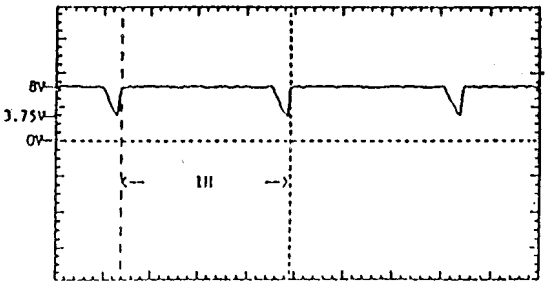

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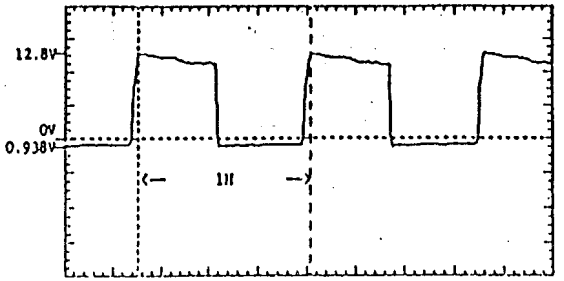
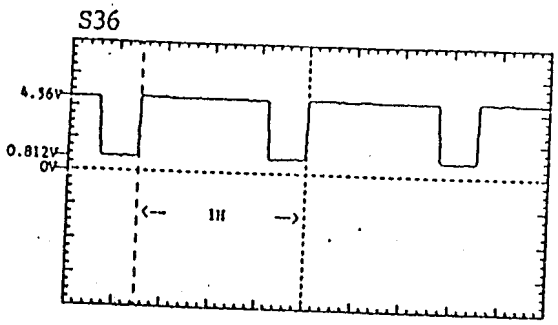
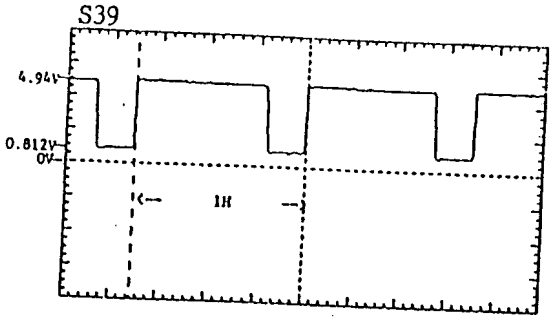
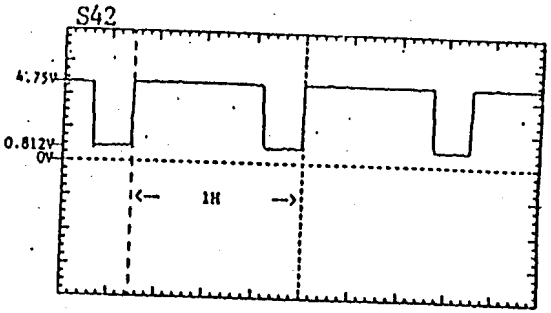
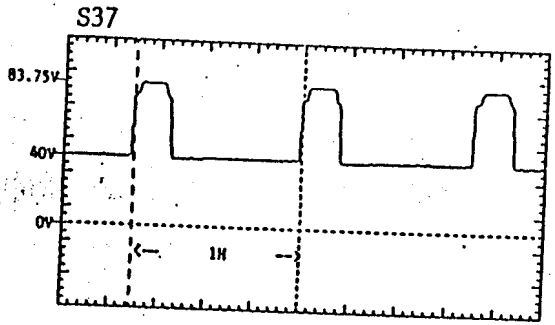
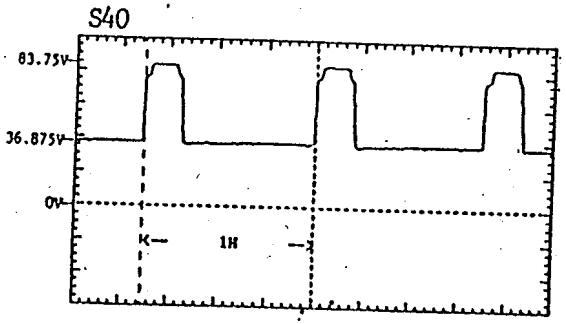


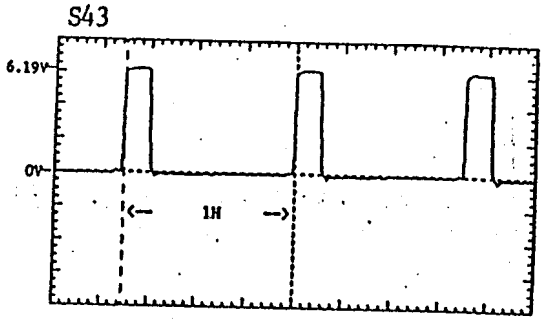

S36
4.56V
0.812V
0V
1H

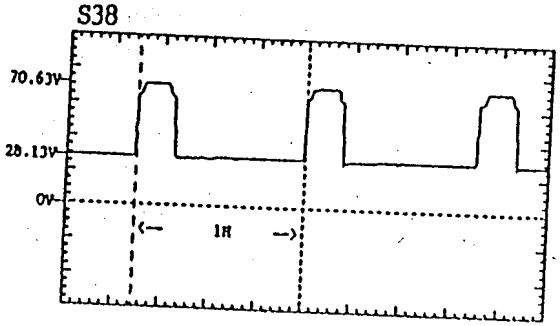

S39
4.94V
0.812V
0V
1H

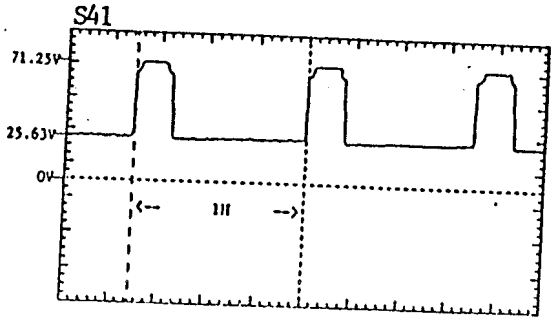

S42
4.75V
0.812V
0V
1H

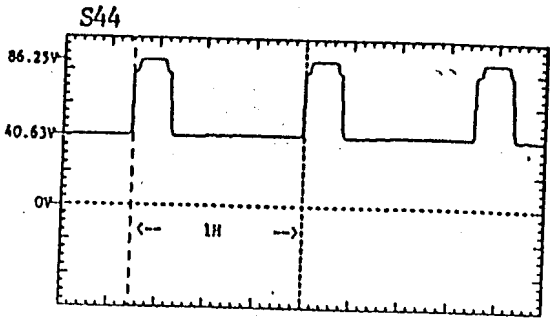

S37
83.75V
40V
0V
1H


S40
83.75V
36.875V
0V
1H

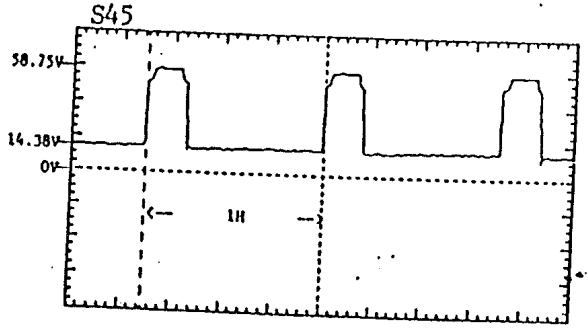

S43
6.19V
0V
1H


S38
70.63V
28.13V
0V
1H

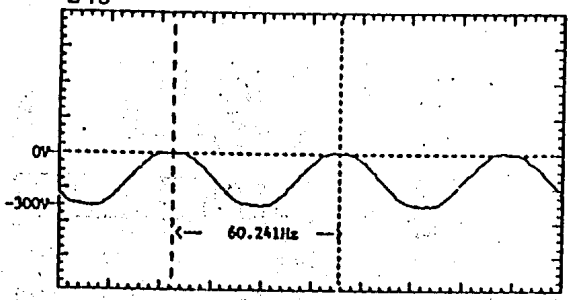

S41
71.25V
25.63V
0V
1H


S44
86.25V
40.63V
0V
1H

S45



S46



11. ELECTRICAL PARTS LIST

11.1 BOARD NAME : A17DXF30150 MAIN BD ASS'Y

NO.	*PART NO.*	*SPEC/DESCRIPTION*	*LOCATION*
1	CPI33450VHJ	CAP.PEI 0.33μf 50VJ	C202
2	CEA1C0451L1	CAP.ELECT 1μf 450V	C525
3	CEA33C251L1	CAP.ELECT 33μf 250V	C791
4	CEA22135VL1	CAP.ELECT 220μf 35V	C204,C205,C504
5	CEA10235VL1	CAP.ELECT 1000μf 35V	C793
6	D*FBYT52D*E	DIODE RECOVERY : BYT52D	D110,D118,D119 D120,D121,D122, D123,D203,D713 D901,D911
7	D*F30DF6**A	DIODE RECOVERY : 30DF6	D116
8	D*FBYT8613E	DIODE RECOVERY : BYT86-1300	D108
9	D*FBYT8660E	DIODE RECOVERY : BYT86-600	D109
10	D*FBYT53J*E	DIODE RECOVERY : BYT53J	D511,D512
11	D*ZHZ12A2*H	DIODE ZENER: 11.9V-12.4V 1/2W	ZD101,ZD102, ZD103,ZD104, ZD105,ZD109, ZD902,ZD903
12	ICCD4051BER	IC CD4051BE DIP-16 PIN	IC004
13	ICL7812CV*J	IC L7812CV TO-220 3 PIN	IC706
14	ICNE555P**X	IC NE555P DIP-8 PIN	IC104
15	ICTDA1675AJ	IC TDA1675A MULTIWATT 15 PIN	IC201
16	ICTDA8146*J	IC TDA8146	IC905
17	Q*2SA1306BG	TRANSISTOR 2SA1306B	Q908
18	Q*2SA673**H	TRANSISTOR 2SA673 (TO-92)	Q112,Q204,Q706
19	Q*2SC1213CH	TRANSISTOR 2SC1213C (TO-92)	Q203,Q906,Q909
20	Q*2SC1921*H	TRANSISTOR 2SC1921(TO-92 MOD)	Q504
21	Q*2SC2899*H	TRANSISTOR 2SC2899 (TO-126)	Q911
22	Q*2SC4747*H	TRANSISTOR 2SC4747 (TO-3P)	Q109
23	Q*2SD1133*H	TRANSISTOR 2SD1133 (TO-220AB)	Q108
24	Q*2SD799**G	TRANSISTOR 2SD799 (TO-220AB)	Q117
25	Q*2SK1378*G	TRANSISTOR 2SK1378 (TO-220AB)	Q110,Q116,Q119
26	Q*2SK891**G	TRANSISTOR 2SK891 (TO-220AB)	Q107
27	TF26V0011L0	X'FMR F.B.T. 26KV	T103
28	T*I220602F0	H.D.T X'FMR EI-22*06	T101
29	T*I281103F0	CHOKE COIL EEL-28*11 4.5mH	L105

11.2 BOARD NAME : A17DXF30151 VIDEO BD ASS'Y

NO.	PART NO.	SPEC/DESCRIPTION	LOCATION
1	CEA22135VL1	CAP.ELECT 220μF 35V	C439
2	ICLM1203BND	IC LM1203BN DIP-28 PIN	IC401
3	ICLM393N**D	IC LM393N DIP-8PIN	IC402
4	Q*2SA1810CH	TRANSISTOR 2SA1810 TO-126	Q409,Q415,Q421
5	Q*2SC1213CH	TRANSISTOR 2SC1213C (TO-92)	Q404,Q405,Q406, Q411,Q412,Q417, Q418
6	Q*2SC4704CH	TRANSISTOR 2SC4704C TO-126	Q408,Q414,Q420
7	Q*2SC4934EH	TRANSISTOR 2SC4934E TO 126FM	Q407,Q413,Q419

11.3 BOARD NAME : A17DXF30265 SYNC BD ASS'Y

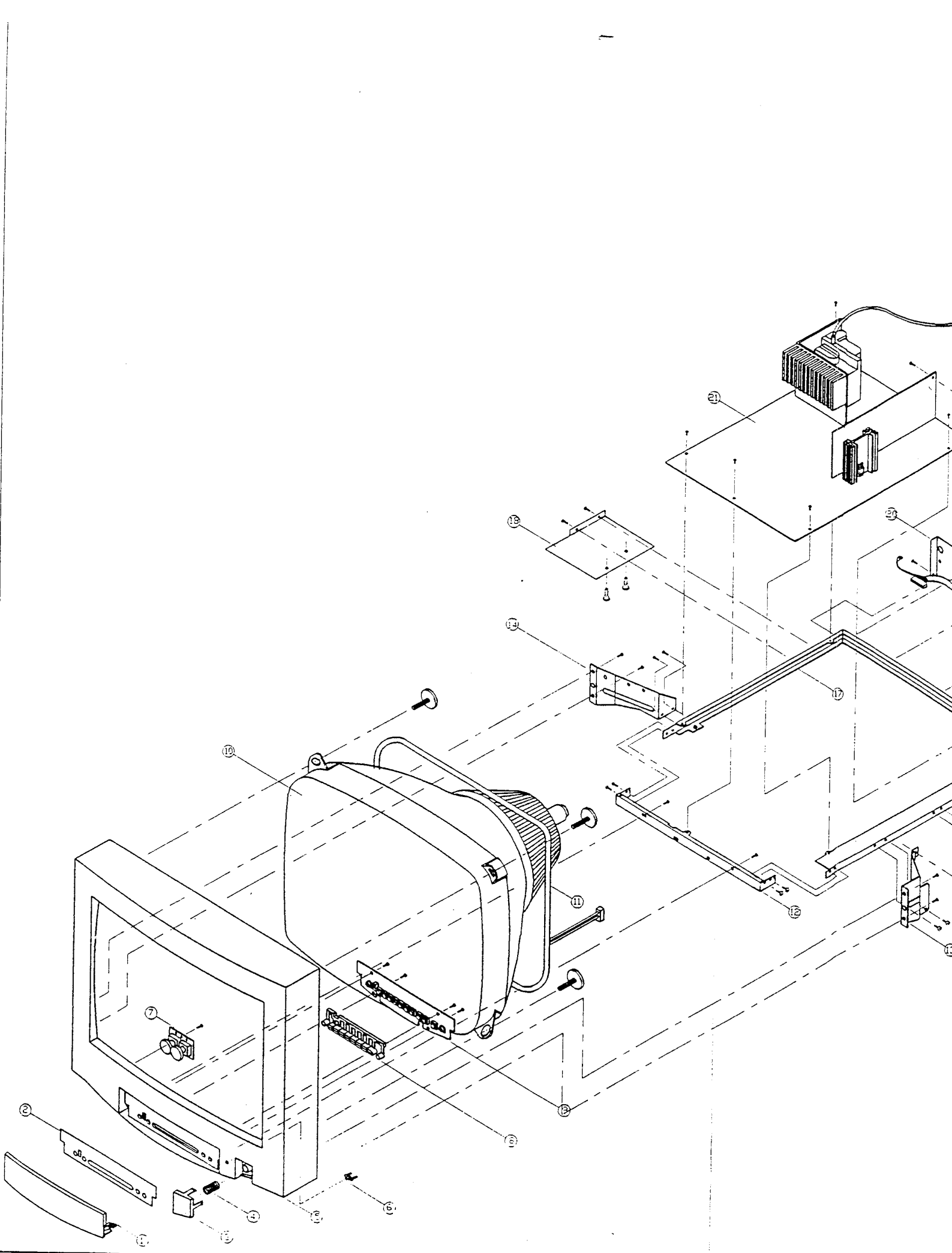
NO.	PART NO.	SPEC/DESCRIPTION	LOCATION
1	D*G1N4148*L	DIODE GENERAL PURPOSE : 1N4148	D101,D506,D507, D508,D509,D513, D701,D702,D705
2	ICDM74LS38D	IC DM74LS38 DIP-14 PIN	IC703
3	ICLA7850**S	IC LA7850 DIP-20 PIN	IC101
4	ICM74HC86ND	IC MM74HC86N DIP-14 PIN	IC701,IC702
5	IC4HC4538PP	IC PC74HC4538P DIP-14 PIN	IC704
6	ICLM339N**D	IC LM339N DIP-14 PIN	IC705
7	Q*2SA673**H	TRANSISTOR 2SA673 (TO-92)	Q104,Q105
6	Q*H945P***H	TRANSISTOR H945P (TO-92)	Q100,Q103,Q105, Q506,Q507,Q508, Q701,Q702,Q703, Q704,Q708

11.4 BOARD NAME : A17DXF30304 CRT ASS'Y

NO.	PART NO.	SPEC/DESCRIPTION	LOCATION
1	BCC17I028H*	CRT 17" COLOR	CRT

11.5 BOARD NAME : A17DXF30157 POWER BD ASS'Y

NO.	*PART NO.*	*SPEC/DESCRIPTION*	*LOCATION*
1	CEA2C2451L1	CAP.ELECT 2.2μf 450V	C321
2	CEA33C251L1	CAP.ELECT 33μf 250V	C344
3	CEA101251L1	CAP.ELECT 100μf 250V	C327
4	CEA22135VL1	CAP.ELECT 220μf 35V	C320
5	CEA10216VL1	CAP.ELECT 1000μf 16V	C330
6	CEA10235VL1	CAP.ELECT 1000μf 35V	C332
7	D*F10DF2**A	DIODE RECOVERY : 10DF2	D318
8	D*FBA159**B	DIODE RECOVERY : BA159/1A 1KV	D062,D306,D308
9	D*FBYM36A*Q	DIODE RECOVERY : BYM36A	D063,D322
10	D*FBYM36C*Q	FAST RECOVERY DIODE BYM36C	D320
11	D*FBYM36E*Q	FAST RECOVERY DIODE BYM36E	D319
12	D*G1N4002*W	DIODE GENERAL PURPOSE : 1N4002	D315,D064,D065
13	D*G1N4007*B	DIODE GENERAL PURPOSE : 1N4007	D317,D324,D325
14	FH****003D*	FUSE CLIPER (5*20mm)	FC301,FC302
15	IC4N35T***M	IC 4N35T DIP-6 PIN	IC062,IC302
16	ICC74HC14PP	IC PC74HC14P DIP-14 pin	IC061
17	ICCS3842A*Y	IC CS3842A DIP-8 PIN	IC301
18	ICLM317T**M	IC LM317T TO-220 3 PIN	IC060
19	ICTL431CLPM	IC TL431CLP TO-92 3 PIN	IC305
20	ICTR80145AE	IC STR80145A 5 PIN	IC304
21	Q*2SA673**H	TRANSISTOR 2SA673 (TO-92)	Q310
22	Q*2SB857**H	TRANSISTOR 2SB857 (TO-220AB)	Q063
23	Q*2SC1213CH	TRANSISTOR 2SC1213C (TO-92)	Q061,Q064,Q065, Q066,Q067,Q068, Q069,Q304,Q307, Q308,Q309
24	Q*2SC2979*H	TRANSISTOR 2SC2979 (TO-220AB)	Q062
25	Q*2SK1794*N	TRANSISTOR 2SK1794	Q301
26	RL212V5A0M1	RELAY AC 2S 250Vac 5A/12Vdc	RL301
27	RMB680C21J8	RES. FUSIBLE 0.68 Ohm 2W J	R351
28	RMV220C21J8	RES. WIRE WOUND 0.22 Ohm 2W J	R311
39	T*E190524E0	POWER X'FMR EEL-19*05 23mH	T060
30	VAP14R253W4	PROSISTOR 14 Ohm 25 A 2P	TH301
31	VAN5R0402T2	THERMISTOR 5 Ohm 4A	TH302
32	VRD101B03J*	VR. (B) 100 Ohm LAYER DOUBLE	VR301
33	VRD201B03J*	VR. (B) 200 Ohm LAYER DOUBLE	VR060


21
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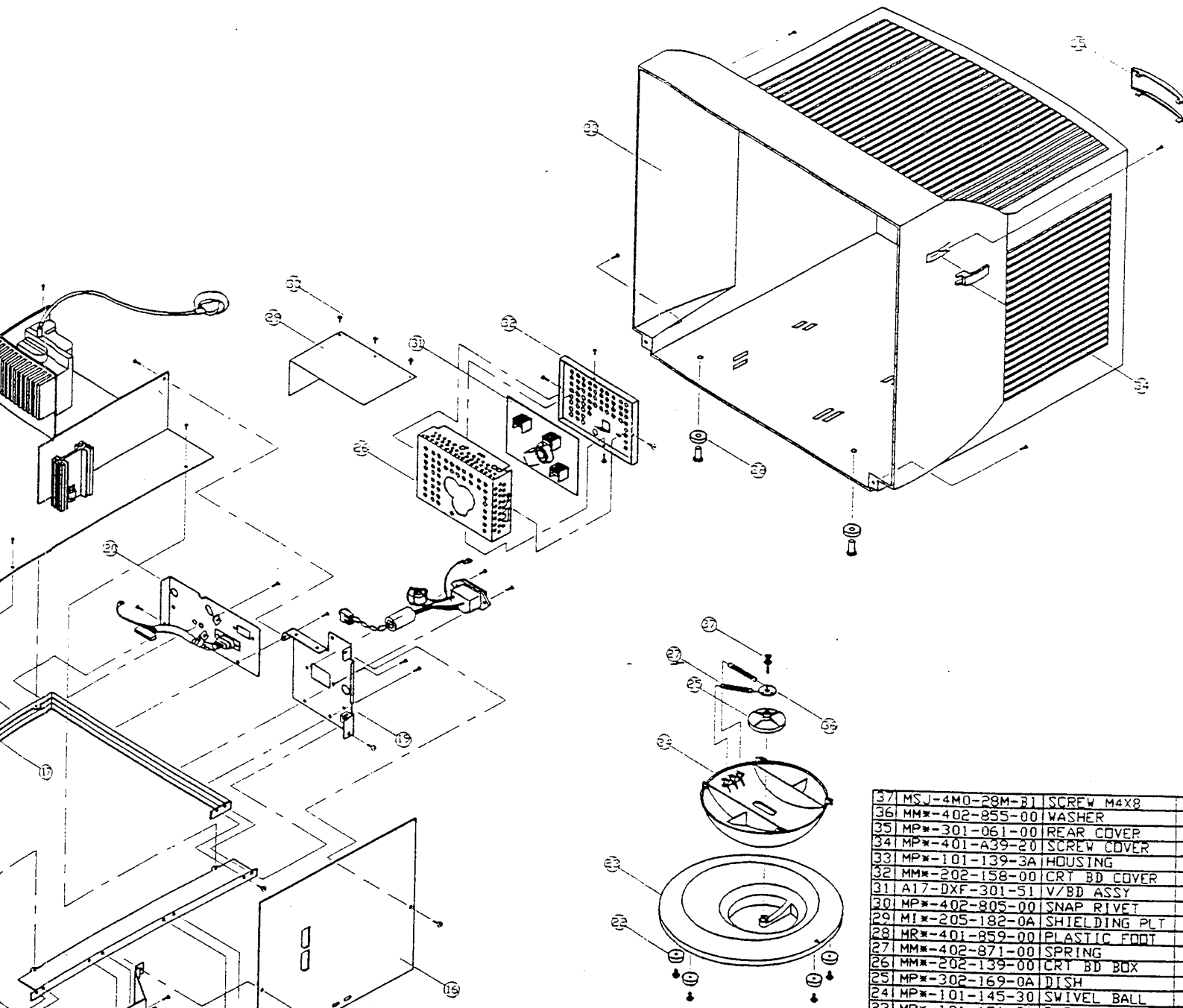
REVISIONS			
ECN	REV	DESCRIPTION	DATE



ITEM	PART NO.	DESCRIPTION
37	MSJ-4M0-28M-B1	SCREW M4X8
36	MM*-402-855-00	WASHER
35	MP*-301-061-00	REAR COVER
34	MP*-401-A39-20	SCREW COVER
33	MP*-101-139-3A	HOUSING
32	MM*-202-158-00	CRT BD COVER
31	A17-DXF-301-51	V/BD ASSY
30	MP*-402-805-00	SNAP RIVET
29	MI*-205-182-0A	SHIELDING PLT
28	MR*-401-859-00	PLASTIC FOOT
27	MM*-402-871-00	SPRING
26	MM*-202-139-00	CRT BD BOX
25	MP*-302-169-0A	DISH
24	MP*-101-145-30	SWIVEL BALL
23	MP*-101-171-3A	B-BASE
22	MR*-401-530-00	RUBBER FOOT
21	A17-DXF-301-50	MAIN BD ASSY
20	MM*-402-750-00	D-SUB BKT
19	MM*-302-126-00	REAR PLATE
18	MI*-405-898-0A	INSULATOR
17	MM*-302-127-00	BASE PLATE(R)
16	A17-DXF-301-57	PWR BD ASSY
15	MM*-402-749-00	PWR BD BKT
14	MM*-302-129-0A	SIDE PLATE(L)
13	MM*-302-125-0A	SIDE PLATE
12	MM*-302-130-00	BASE PLATE(F)
11	LD*-171-16R-NA	DGS COIL
10	BCC-171-028-H*	CRT 17"
9	A17-DXF-301-56	DPI BD ASSY
8	MP*-301-097-00	PIANO KEY
7	A17-DXF-301-08	VR BD ASSY
6	MP*-401-798-00	LENS
5	MP*-101-138-4A	BEZEL
4	MM*-402-555-0B	SPRING
3	MP*-401-768-20	POWER KNOB
2	MM*-201-119-20	MAIN PLATE
1	MP*-201-117-30	DOOR

	DX 17F
NEXT ASSY	USED ON
APPLICATION	
THIRD ANGLE PROJECTION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN
TOLERANCES
FRACTIONAL ±
DECIMALS .XX ± .XXX ±
METRIC 0.X ± 0.XX ±
ANGLES
MATERIAL FINISH
DO NOT SCALE DRAWING

NAME: EXPLODE DWG

PART:

DATE:	SCALE:	DWG BY:	APPROVED:
3-22-94'			

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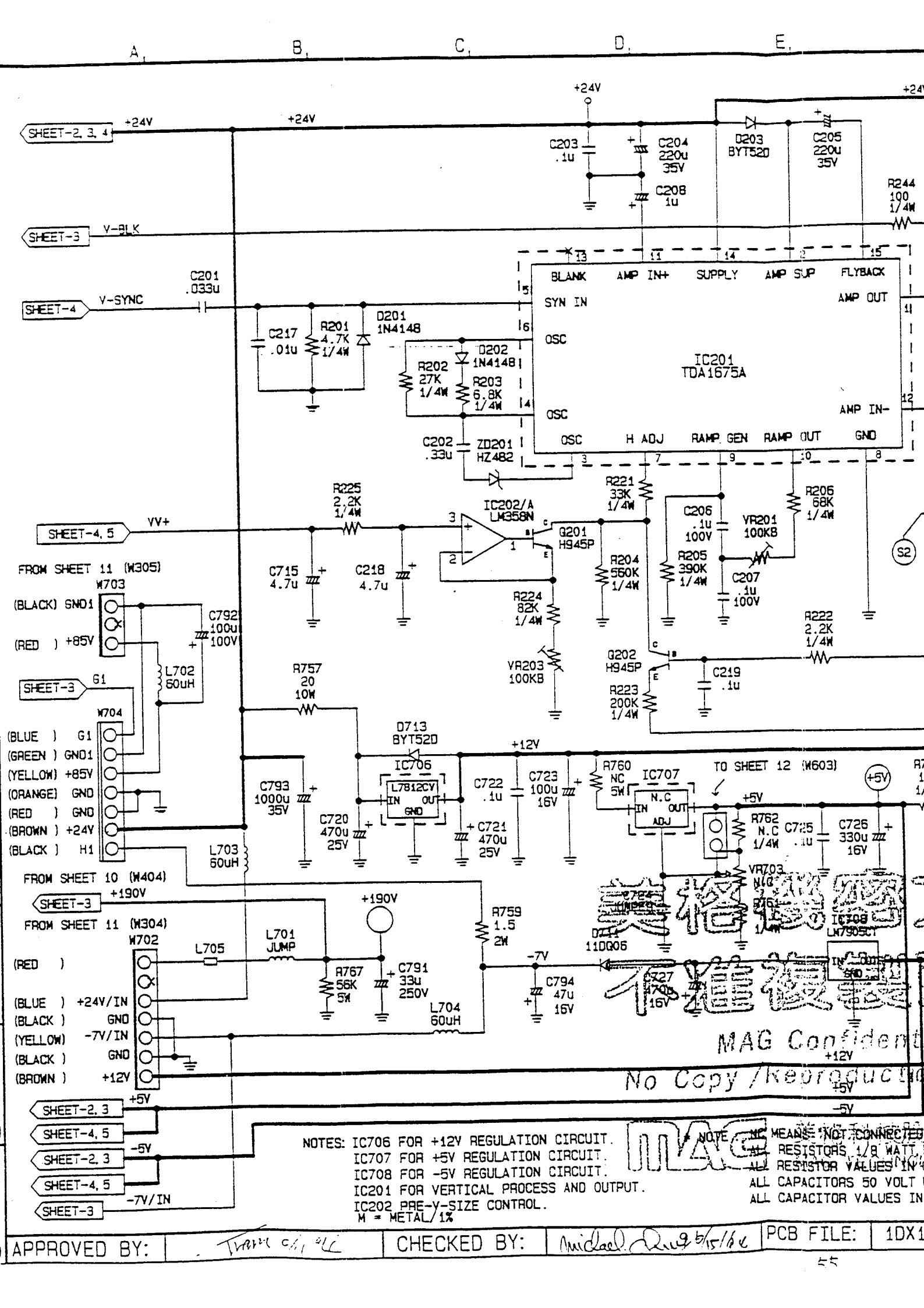
PAGE. SHEET: OF


A
B
C
D
E
+24V
SHEET-2, 3, 4
C203 .1u
C204 220u 35V
C208 1u
D203 BYT520
C205 220u 35V
R244 100 1/4W
SHEET-3
V-BLK
C201 .033u
SHEET-4
V-SYNC
C217 .01u
R201 4.7K 1/4W
D201 1N4148
D202 1N4148
R202 27K 1/4W
R203 6.8K 1/4W
C202 .33u
ZD201 HZ482
BLANK
AMP IN+
SUPPLY
AMP SUP
FLYBACK
SYN IN
AMP OUT
OSC
IC201 TDA1675A
OSC
AMP IN-
OSC
H ADJ
RAMP GEN
RAMP OUT
GND
SHEET-4, 5
VV+
R225 2.2K 1/4W
IC202/A LM358N
Q201 H945P
R221 33K 1/4W
C206 .1u 100V
VR201 100KB
R206 68K 1/4W
S2
C715 4.7u
C218 4.7u
R204 560K 1/4W
R205 390K 1/4W
C207 .1u 100V
R224 82K 1/4W
R222 2.2K 1/4W
VR203 100KB
Q202 H945P
C219 .1u
R223 200K 1/4W
FROM SHEET 11 (W305)
W703
(BLACK) GND1
(RED) +85V
C792 100u 100V
L702 60uH
SHEET-3
G1
R757 20 10W
W704
(BLUE) G1
(GREEN) GND1
(YELLOW) +85V
(ORANGE) GND
(RED) GND
(BROWN) +24V
(BLACK) H1
L703 60uH
D713 BYT520
+12V
IC706
L7812CV
IN OUT GND
C793 1000u 35V
C720 470u 25V
C722 .1u
C721 470u 25V
C723 100u 16V
R760 NC 5W
IC707
N.C
IN OUT ADJ
TO SHEET 12 (W603)
+5V
R762 N.C 1/4W
C725 .1u
C726 330u 16V
VR703 N.C
FROM SHEET 10 (W404)
SHEET-3
+190V
FROM SHEET 11 (W304)
W702
L705
L701 JUMP
+190V
R759 1.5 2W
(RED)
(BLUE) +24V/IN
(BLACK) GND
(YELLOW) -7V/IN
(BLACK) GND
(BROWN) +12V
R767 56K 5W
C791 33u 250V
L704 60uH
-7V
C794 47u 16V
D714 11DQ06
IC708 LM7905CT
IN OUT GND
+12V
+5V
-5V
SHEET-2, 3
SHEET-4, 5
SHEET-2, 3
SHEET-4, 5
SHEET-3
-7V/IN
NOTES: IC706 FOR +12V REGULATION CIRCUIT.
IC707 FOR +5V REGULATION CIRCUIT.
IC708 FOR -5V REGULATION CIRCUIT.
IC201 FOR VERTICAL PROCESS AND OUTPUT.
IC202 PRE-Y-SIZE CONTROL.
M = METAL/1%
NOTE
NC MEANS NOT CONNECTED
ALL RESISTORS 1/8 WATT
ALL RESISTOR VALUES IN
ALL CAPACITORS 50 VOLT
ALL CAPACITOR VALUES IN
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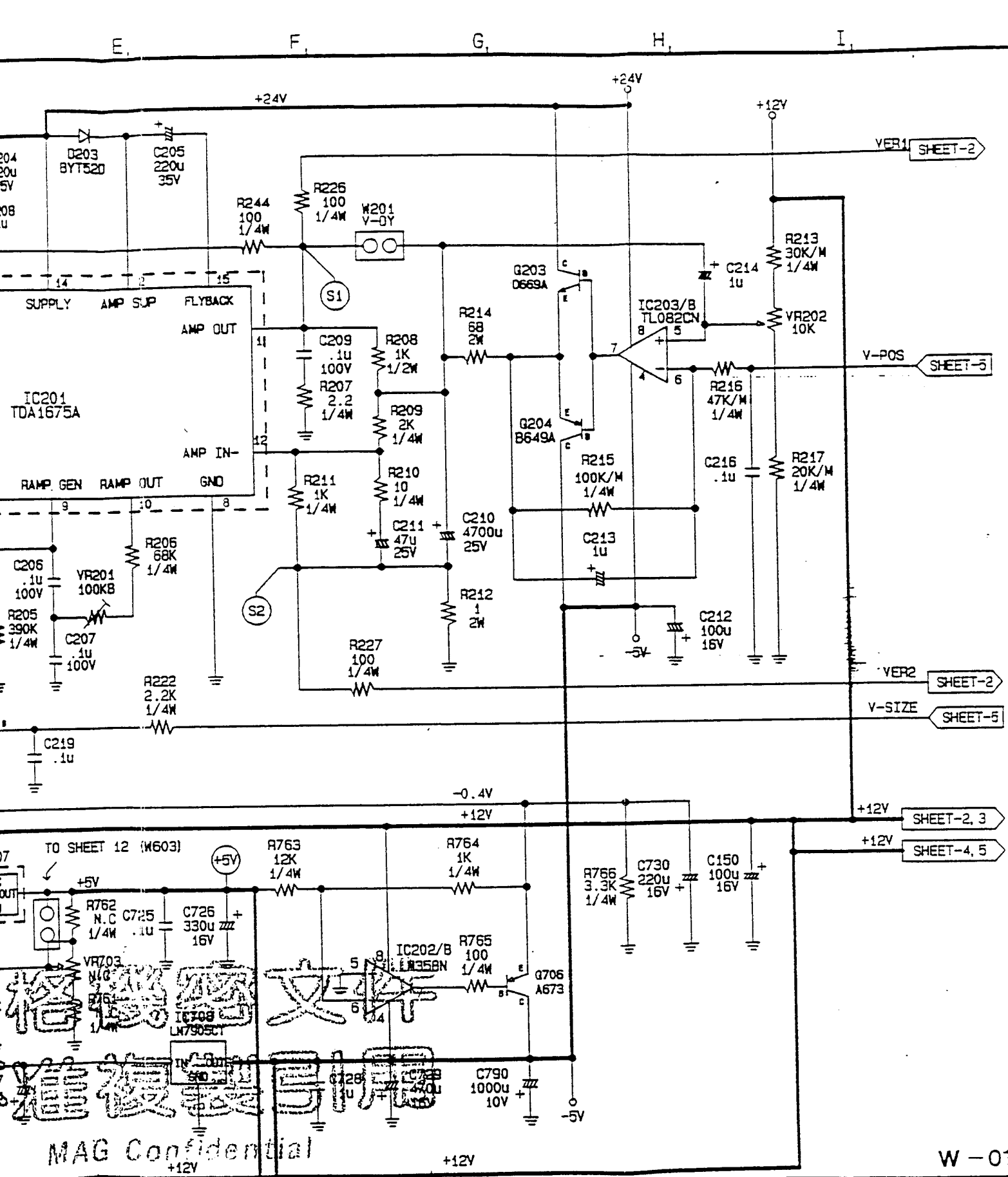
E
F
G
H
I
+24V
+12V
D203
BYT520
C205
220u
35V
R244
100
1/4W
R226
100
1/4W
W201
V-OY
VER1
SHEET-2
S1
SUPPLY
AMP SUP
FLYBACK
AMP OUT
IC201
TDA1675A
AMP IN-
RAMP GEN
RAMP OUT
GND
C209
.1u
100V
R207
2.2
1/4W
R208
1K
1/2W
R209
2K
1/4W
R210
10
1/4W
R211
1K
1/4W
C211
47u
25V
C210
4700u
25V
R212
1
2W
R214
68
2W
G203
D669A
G204
B649A
R215
100K/M
1/4W
C213
1u
IC203/B
TL082CN
C214
1u
R213
30K/M
1/4W
VR202
10K
R216
47K/M
1/4W
V-POS
SHEET-5
C216
.1u
R217
20K/M
1/4W
C212
100u
16V
-5V
VER2
SHEET-2
V-SIZE
SHEET-5
R206
68K
1/4W
VR201
100KB
C206
.1u
100V
R205
390K
1/4W
C207
.1u
100V
R222
2.2K
1/4W
R227
100
1/4W
C219
.1u
-0.4V
+12V
+12V
SHEET-2, 3
+12V
SHEET-4, 5
TO SHEET 12 (W603)
+5V
R763
12K
1/4W
R764
1K
1/4W
R766
3.3K
1/4W
C730
220u
16V
C150
100u
16V
R762
N.C
1/4W
C725
.1u
C726
330u
16V
VR703
N.C
IC202/B
LM358N
R765
100
1/4W
Q706
A673
IC708
LM7905CT
IN
OUT
GND
C728
1u
C729
470u
C790
1000u
10V
-5V
+12V
+5V
-5V
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NOTE
NC MEANS NOT CONNECTED ON PCB BOARD.
ALL RESISTORS 1/8 WATT, 5% UNLESS NOTED.
ALL RESISTOR VALUES IN OHMS UNLESS NOTED.
ALL CAPACITORS 50 VOLT UNLESS NOTED.
ALL CAPACITOR VALUES IN uF UNLESS NOTED.
MODEL
DX17F
CIRCUITRY
MAIN BOARD
MAG TECHNOLOGY
SHEET
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1DX17MH.PCB
FILE:
0DX7M1-7.SCH
DATE
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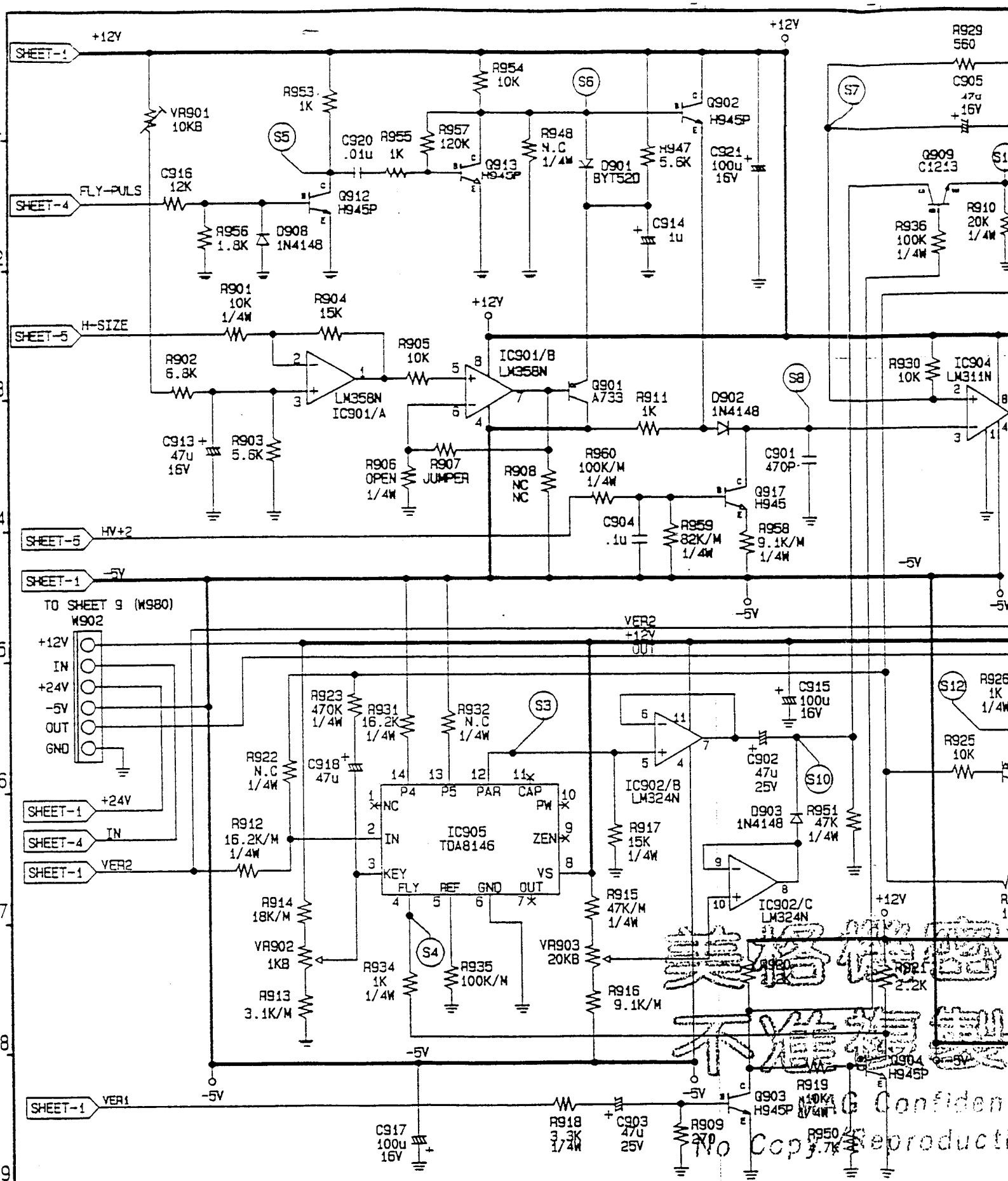

NOTES: IC903 (TC4066) --> PIN14/+12V, PIN6/GND.
IC902, IC903, IC905 FOR PARABOLA PROCESS.
IC901 FOR H-SIZE & REGULATION CONTROL.
IC904 FOR PWM WAVEFROM PROCESS.
M = METAL/1%

NOTE : NC MEANS 'NOT CONNECTED' ON PCB BOARD.
ALL RESISTORS 1/8 WATT, 5% UNLESS NOTED.
ALL RESISTOR VALUES IN OHMS UNLESS NOTED.
ALL CAPACITORS 50 VOLT UNLESS NOTED.
ALL CAPACITOR VALUES IN uF UNLESS NOTED.

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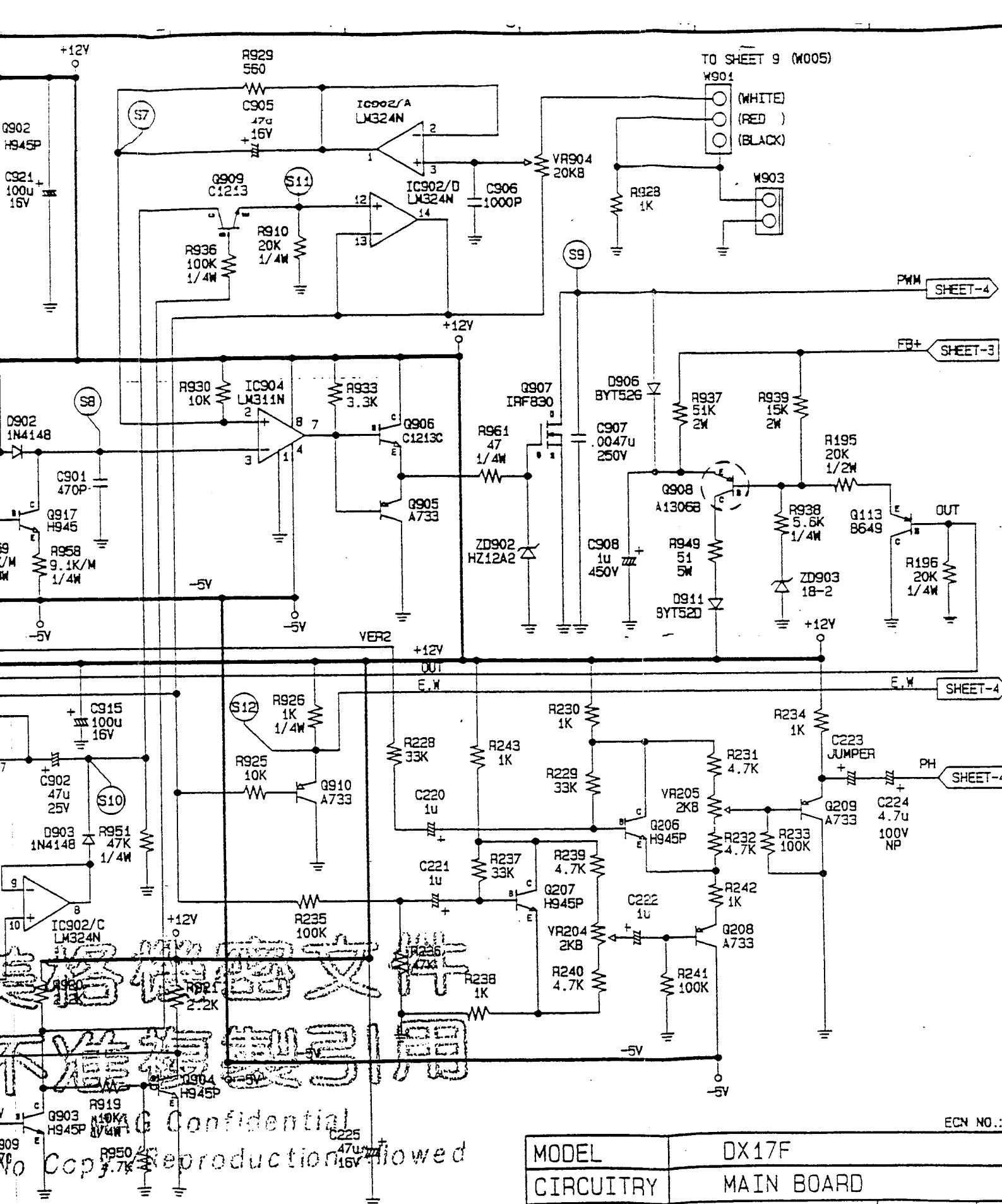

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ECN NO.:

MODEL	DX17F
CIRCUITRY	MAIN BOARD

CTED ON PCB BOARD.
ATT. 5% UNLESS NOTED.
IN OHMS UNLESS NOTED.
OLT UNLESS NOTED.
S IN uF UNLESS NOTED.

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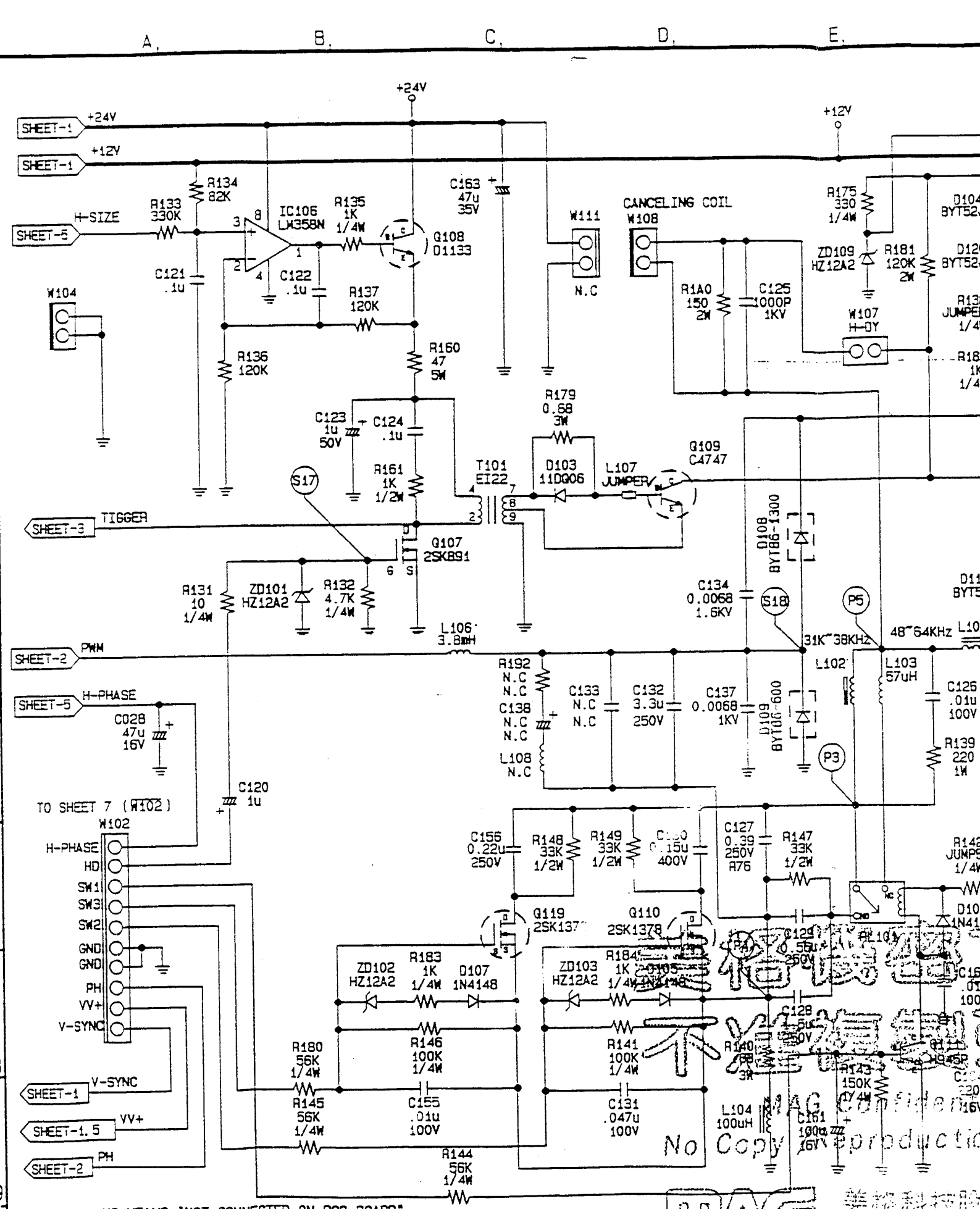
PCB FILE	1DX17MH.PCB	FILE:	0DX7M2-7.SCH	DATE	07/2


A.
B.
C.
D.
E.
+24V
+12V
SHEET-1
SHEET-5
H-SIZE
SHEET-3
TIGGER
SHEET-2
PWM
H-PHASE
TO SHEET 7 (W102)
W102
H-PHASE
HD
SW1
SW3
SW2
GND
GND
PH
VV+
V-SYNC
SHEET-1
V-SYNC
SHEET-1.5
VV+
SHEET-2
PH
CANCELING COIL
W108
W111
N.C
W104
W107
H-DY
IC106 LM358N
Q108 D1133
Q107 2SK891
Q109 C4747
Q119 2SK137
Q110 2SK1378
T101 EI22
D103 11DQ06
D108 BYT86-1300
D109 BYT86-600
ZD101 HZ12A2
ZD102 HZ12A2
ZD103 HZ12A2
ZD109 HZ12A2
D107 1N4148
L106 3.8mH
L107 JUMPER
L102
L103 57uH
L104 100uH
L108 N.C
31K~38KHz
48~64KHz
R133 330K
R134 82K
R135 1K 1/4W
R136 120K
R137 120K
R160 47 5W
R161 1K 1/2W
R179 0.68 3W
R131 10 1/4W
R132 4.7K 1/4W
R175 330 1/4W
R181 120K 2W
R1A0 150 2W
R139 220 1W
R140 68 3W
R141 100K 1/4W
R142 JUMPER 1/4W
R143 150K 1/4W
R144 56K 1/4W
R145 56K 1/4W
R146 100K 1/4W
R147 33K 1/2W
R148 33K 1/2W
R149 33K 1/2W
R180 56K 1/4W
R183 1K 1/4W
R184 1K 1/4W
R192 N.C
C121 .1u
C122 .1u
C123 1u 50V
C124 .1u
C125 1000P 1KV
C126 .01u 100V
C127 0.39 250V R76
C128 0.56u 250V
C129 0.56u 250V
C131 .047u 100V
C132 3.3u 250V
C133 N.C
C134 0.0068 1.6KV
C137 0.0068 1KV
C138 N.C
C155 .01u 100V
C156 0.22u 250V
C161 100u 16V
C163 47u 35V
C028 47u 16V
C120 1u
S17
S18
P5
P3
P4
P1
P2
NOTE : NC MEANS "NOT CONNECTED ON PCB BOARD"
ALL RESISTORS 1/8 WATT, 5% UNLESS NOTED.
ALL RESISTOR VALUES IN OHMS UNLESS NOTED.
ALL CAPACITORS 50 VOLT UNLESS NOTED.
ALL CAPACITOR VALUES IN uF UNLESS NOTED.
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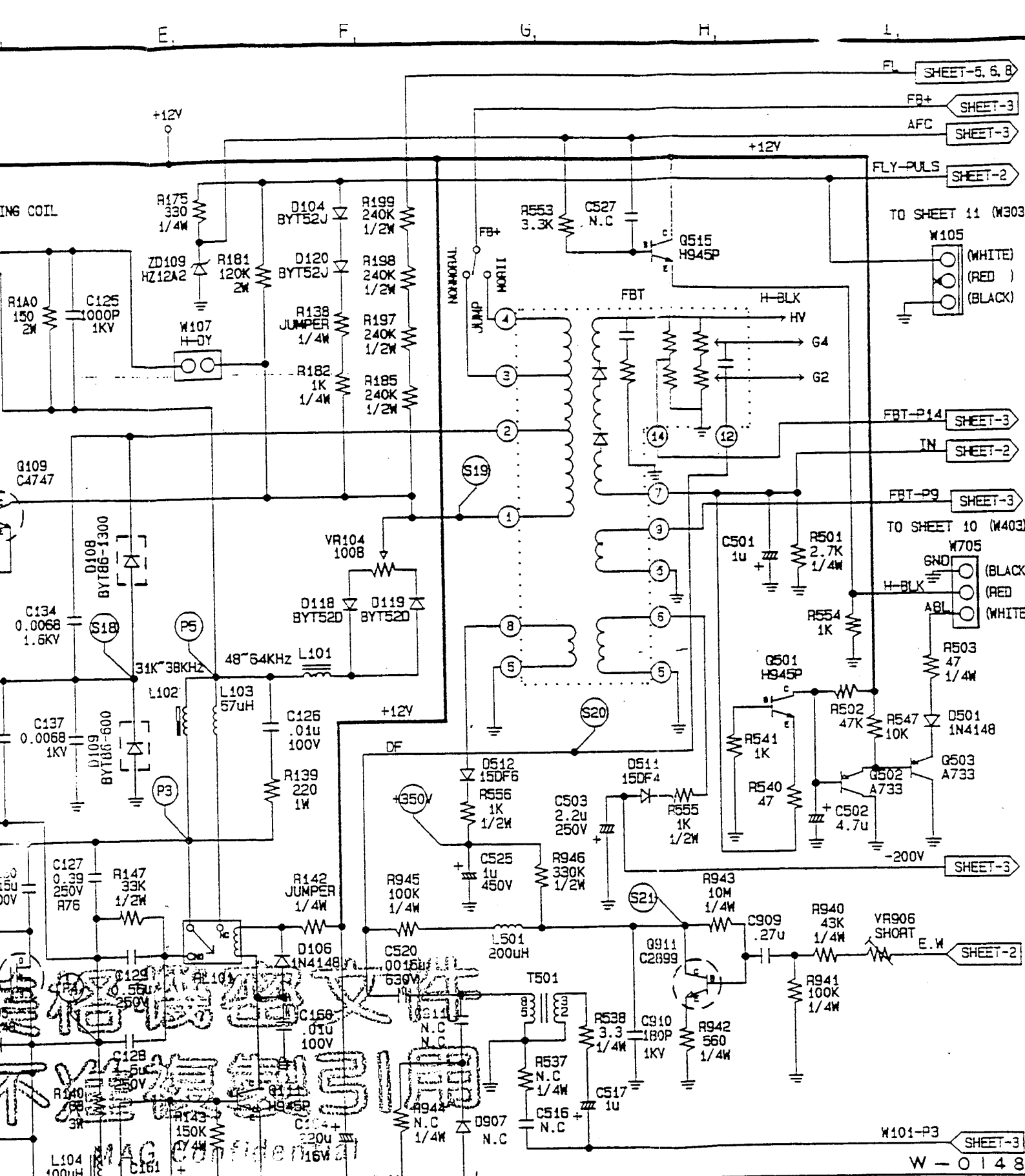

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MODEL	DX17F
CIRCUITRY	MAIN BOARD

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PCB FILE:	1DX17MH.PCB	FILE:	0DX7M4-7.SCH

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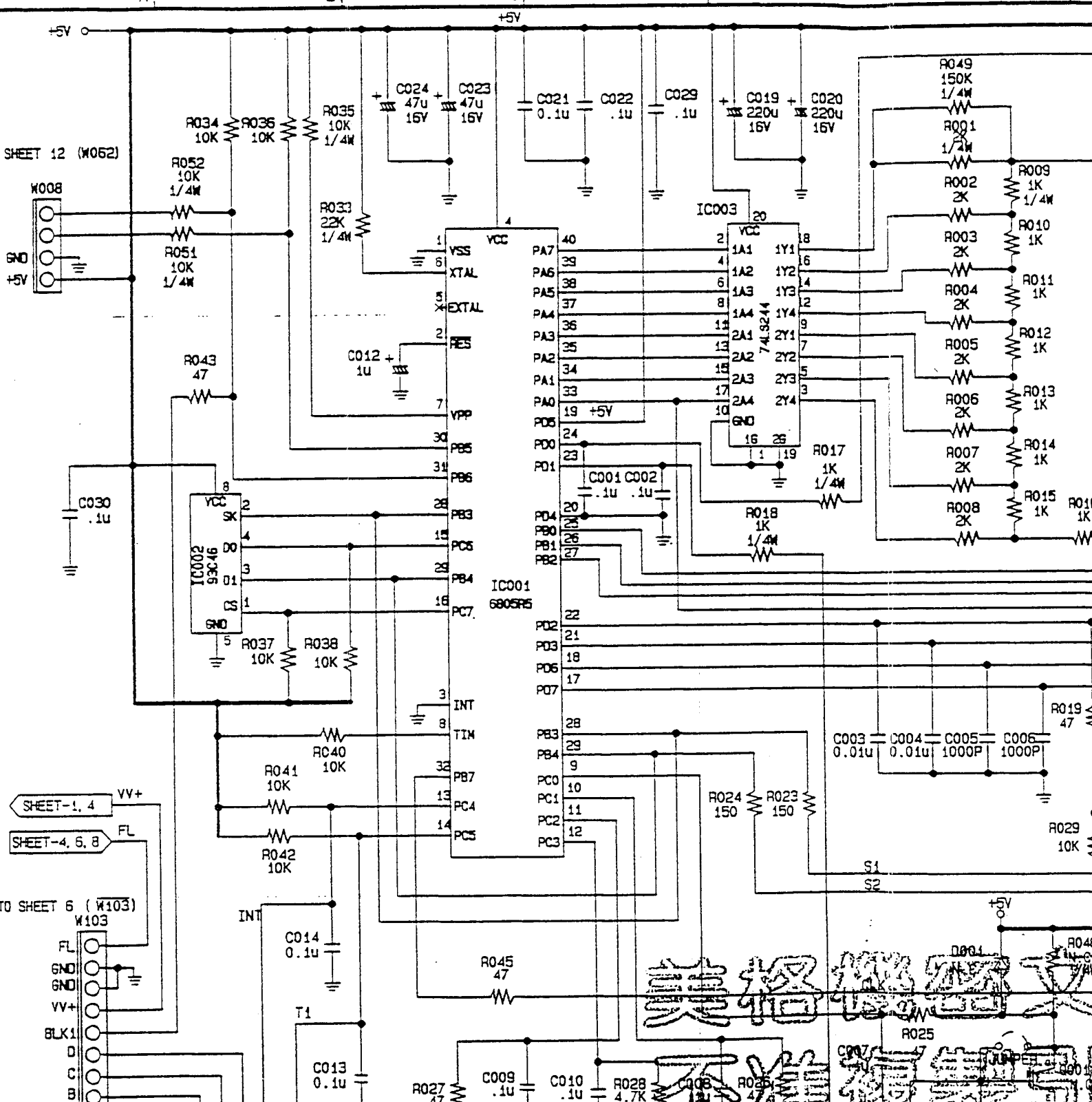
REV:
PCB REV:
DATE 07/



NOTES: IC001, IC002, IC003, IC004, IC005 FOR DIGITAL PROCESS & CONTROL SYSTEM.

NOTE : NC MEANS "NOT CONNECTED ON PCB BOARD"

ALL RESISTORS 1/8 WATT, 5% UNLESS NOTED.

ALL RESISTOR VALUES IN OHMS UNLESS NOTED.

ALL CAPACITORS 50 VOLT UNLESS NOTED.

ALL CAPACITOR VALUES IN uF UNLESS NOTED.

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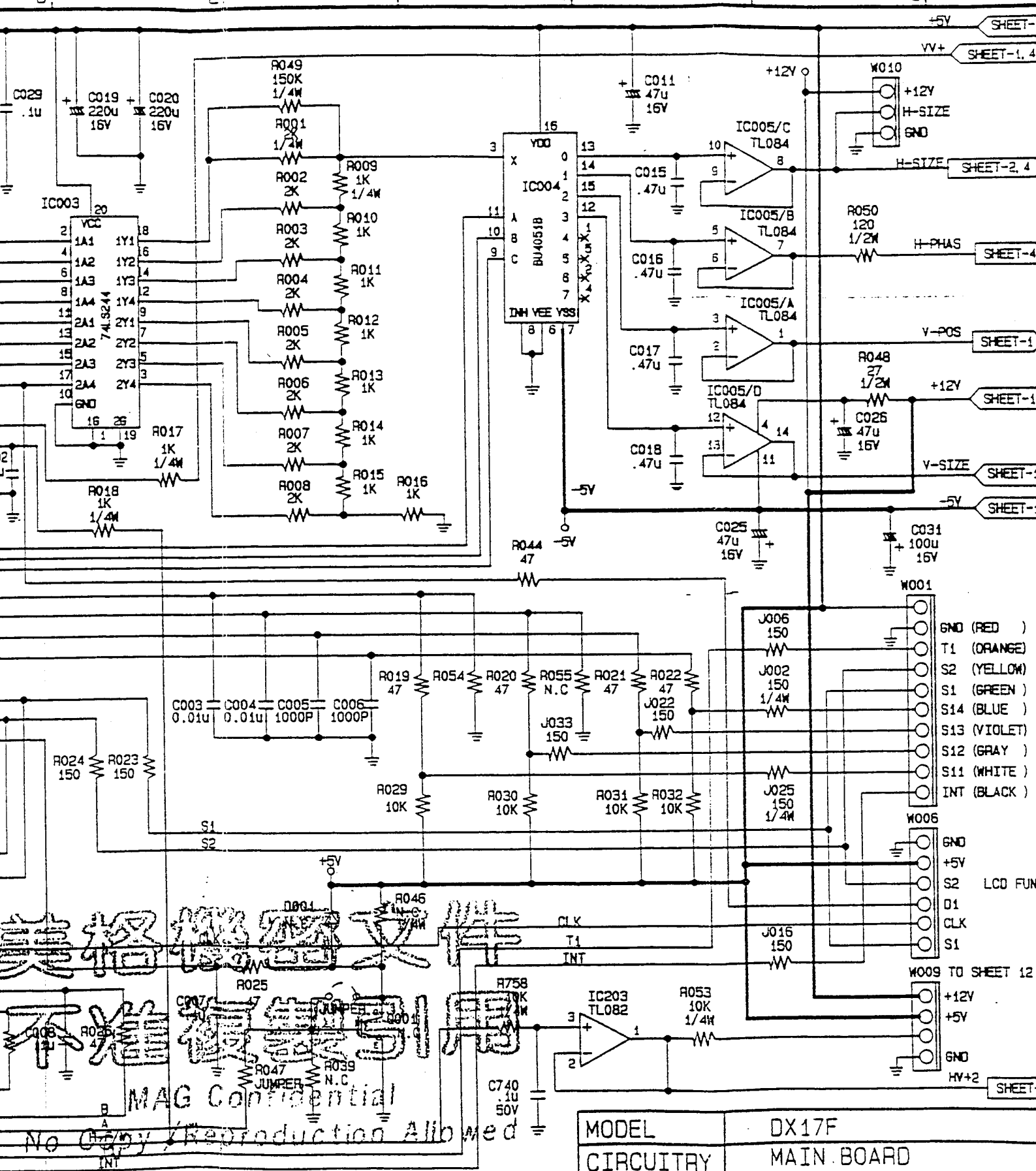

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MODEL	DX17F
CIRCUITRY	MAIN BOARD

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VOLT UNLESS NOTED.
ES IN uF UNLESS NOTED.

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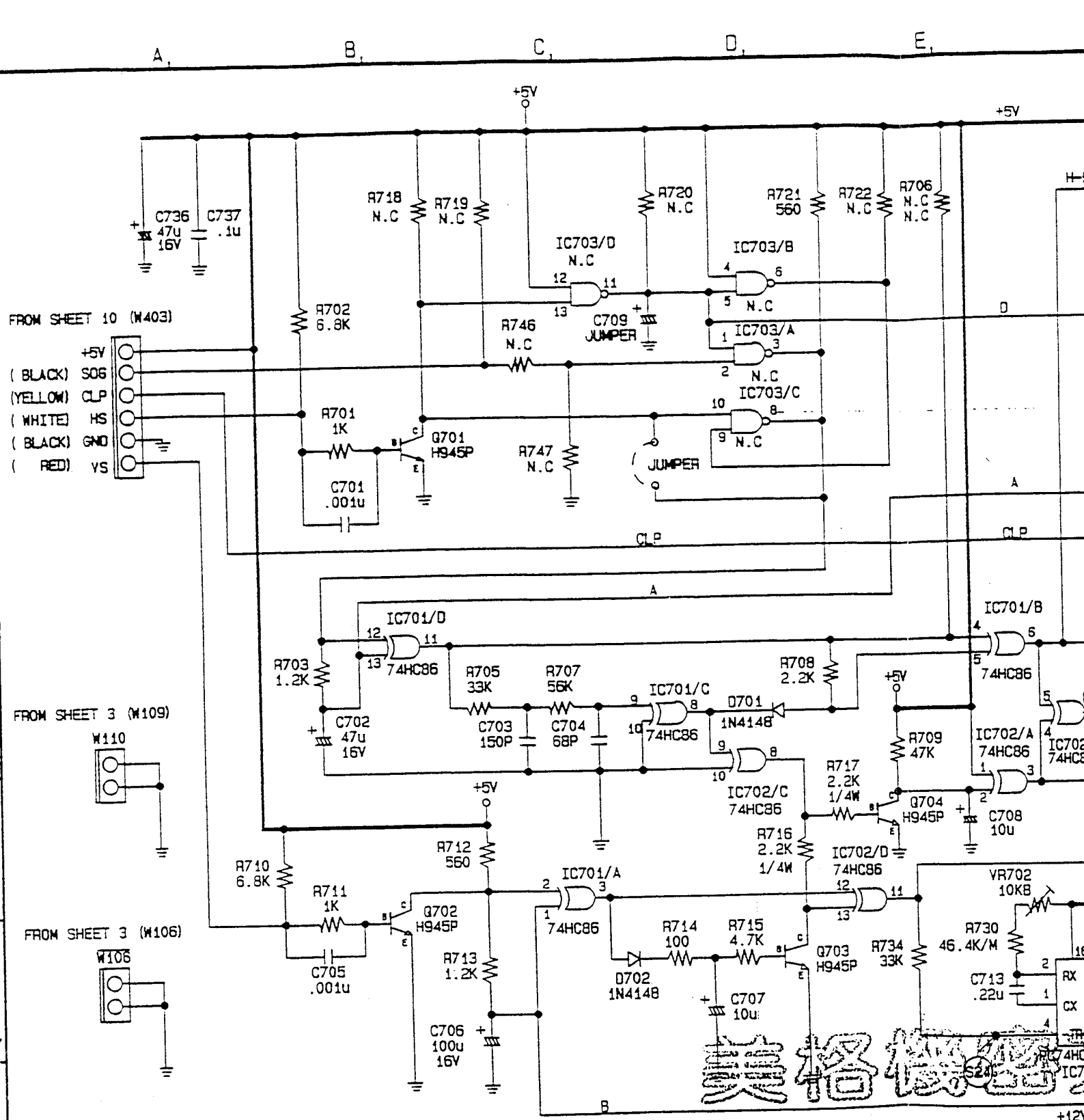
W—0148

PCB FILE:	1DX7MH.PCB	FILE:	0DX7M5-7.SCH	DATE	07



74HC86		
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

74LS38		
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

NOTES:
IC701 (74HC86) —> PIN14 / +5V , PIN 7 / GND
IC702 (74LS86) —> PIN14 / +5V , PIN 7 / GND
IC703 (74LS38) —> PIN14 / +5V , PIN 7 / GND
IC704 (74HC4538) ->PIN16 /+5V , PIN 8 / GND
IC701, IC702, IC703 FOR SYNC PROCESS
IC704 FOR HOR & VER F/V PROCESS
M = METAL/1%

NOTE : NC MEANS "NOT CONNECTED ON PCB BOARD"
ALL RESISTORS 1/8 WATT 5% UNLESS NOTED.
ALL RESISTOR VALUES IN OHMS UNLESS NOTED.
ALL CAPACITORS 50 VOLT UNLESS NOTED.
ALL CAPACITOR VALUES IN uF UNLESS NOTED.

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NECTED ON PCB BOARD"
WAIT. 5% UNLESS NOTED.
ES IN OHMS UNLESS NOTED.
VOLT UNLESS NOTED.
UES IN UF UNLESS NOTED.

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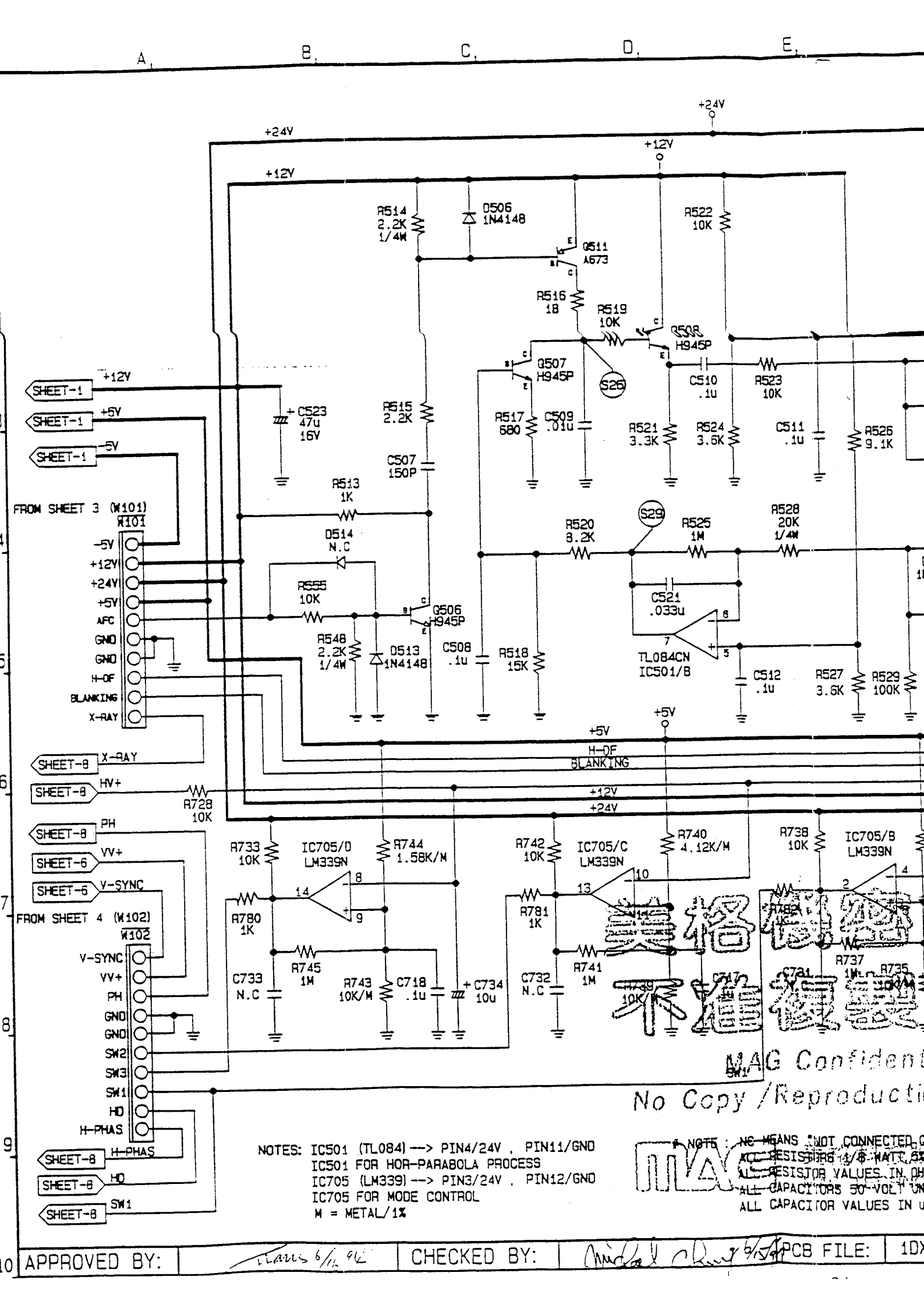
MODEL	DX17F
CIRCUITRY	SYNC BOARD
MAG TECHNOLOGY	SHEET
	REV:
	PCB REV:
PCB FILE: 1DX7JE.PCB	FILE: 0DX7J1-7.SCH
	DATE


A
B
C
D
E
+24V
+12V
+5V
-5V
R514 2.2K 1/4W
D506 1N4148
Q511 A673
R516 18
R519 10K
Q508 H945P
Q507 H945P
S26
R522 10K
C510 .1u
R523 10K
R515 2.2K
C507 150P
R517 680
C509 .01u
R521 3.3K
R524 3.6K
C511 .1u
R526 9.1K
C523 47u 16V
R513 1K
D514 N.C
S29
R520 8.2K
R525 1M
R528 20K 1/4W
C521 .033u
R555 10K
Q506 H945P
R548 2.2K 1/4W
D513 1N4148
C508 .1u
R518 15K
TL084CN IC501/B
C512 .1u
R527 3.6K
R529 100K
FROM SHEET 3 (W101)
W101
-5V
+12V
+24V
+5V
AFC
GND
GND
H-DF
BLANKING
X-RAY
SHEET-1 +12V
SHEET-1 +5V
SHEET-1 -5V
SHEET-8 X-RAY
SHEET-8 HV+
R728 10K
H-DF
BLANKING
SHEET-8 PH
SHEET-6 VV+
SHEET-6 V-SYNC
FROM SHEET 4 (W102)
W102
V-SYNC
VV+
PH
GND
GND
SW2
SW3
SW1
HD
H-PHAS
SHEET-8 H-PHAS
SHEET-8 HD
SHEET-8 SW1
R733 10K
IC705/D LM339N
R744 1.58K/M
R780 1K
R745 1M
C733 N.C
R743 10K/M
C718 .1u
C734 10u
R742 10K
IC705/C LM339N
R740 4.12K/M
R781 1K
R741 1M
C732 N.C
R738 10K
IC705/B LM339N
R737 1M
R735
C731
C717
R739 10K/M
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NOTES: IC501 (TL084) --> PIN4/24V , PIN11/GND
IC501 FOR HOR-PARABOLA PROCESS
IC705 (LM339) --> PIN3/24V , PIN12/GND
IC705 FOR MODE CONTROL
M = METAL/1%
NOTE : NC MEANS "NOT CONNECTED"
ALL RESISTORS 1/8 WATT 5%
ALL RESISTOR VALUES IN OH
ALL CAPACITORS 50 VOLT UN
ALL CAPACITOR VALUES IN u
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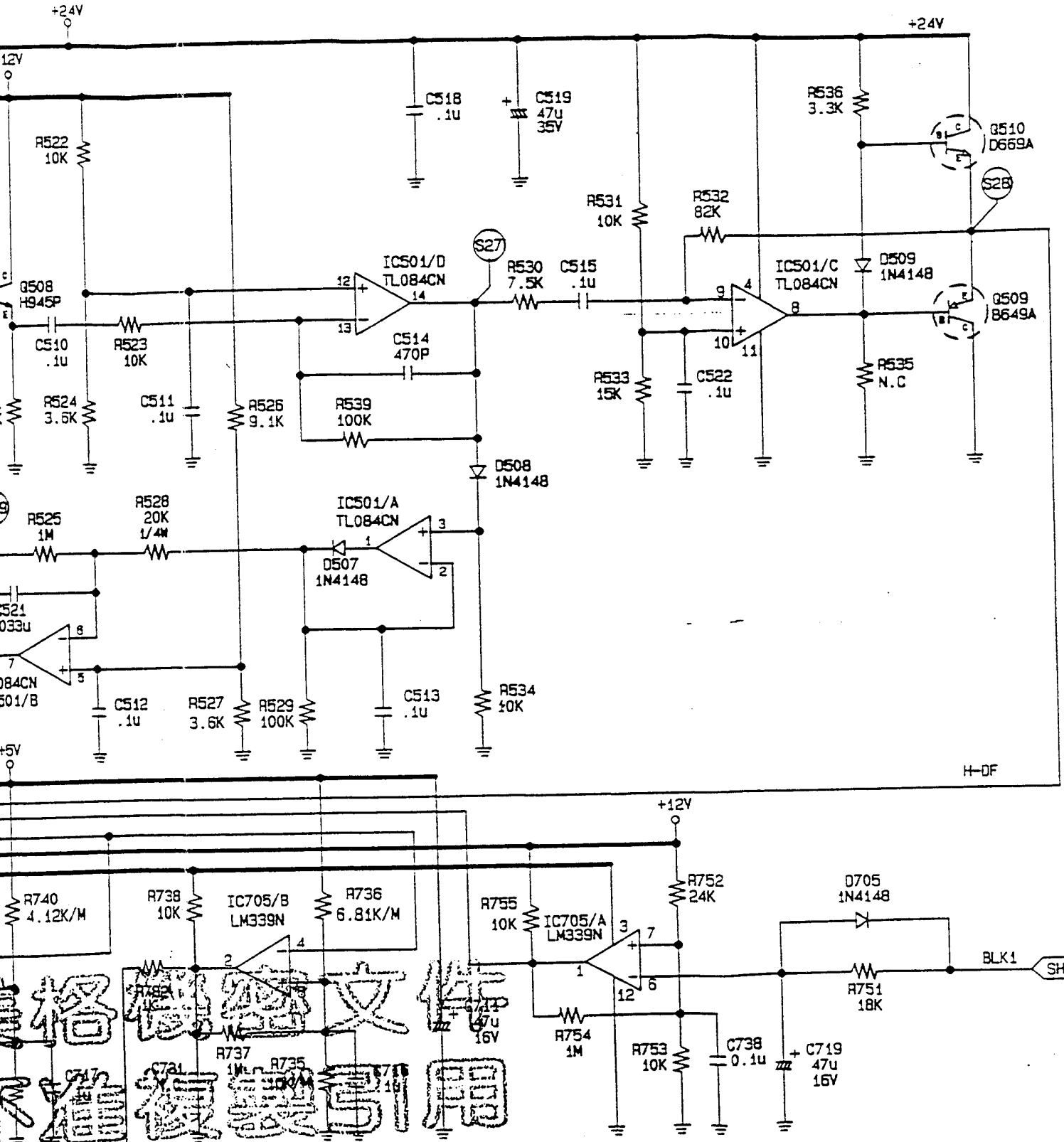

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NOTE : NC MEANS "NOT CONNECTED ON PCB BOARD"
ALL RESISTORS 1/8 WATT 5% UNLESS NOTED.
ALL RESISTOR VALUES IN OHMS UNLESS NOTED.
ALL CAPACITORS 50 VOLT UNLESS NOTED.
ALL CAPACITOR VALUES IN uF UNLESS NOTED.

MODEL	DX17F
CIRCUITRY	SYNC BOARD

MAG TECHNOLOGY

SHEET	07
REV:	
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PCB FILE:	1DX7JE.PCB	FILE:	0DX7J2-7.SCH
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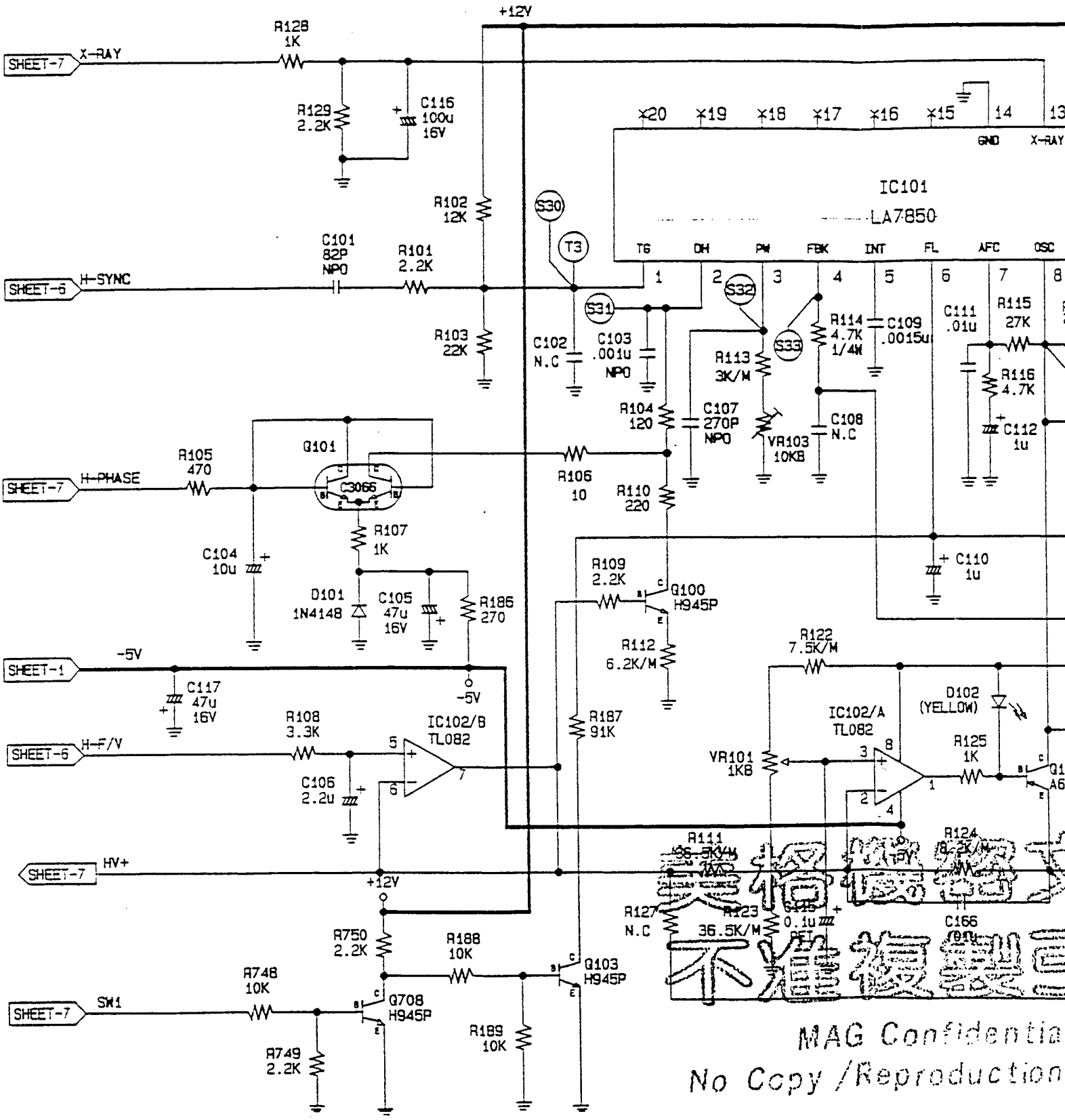

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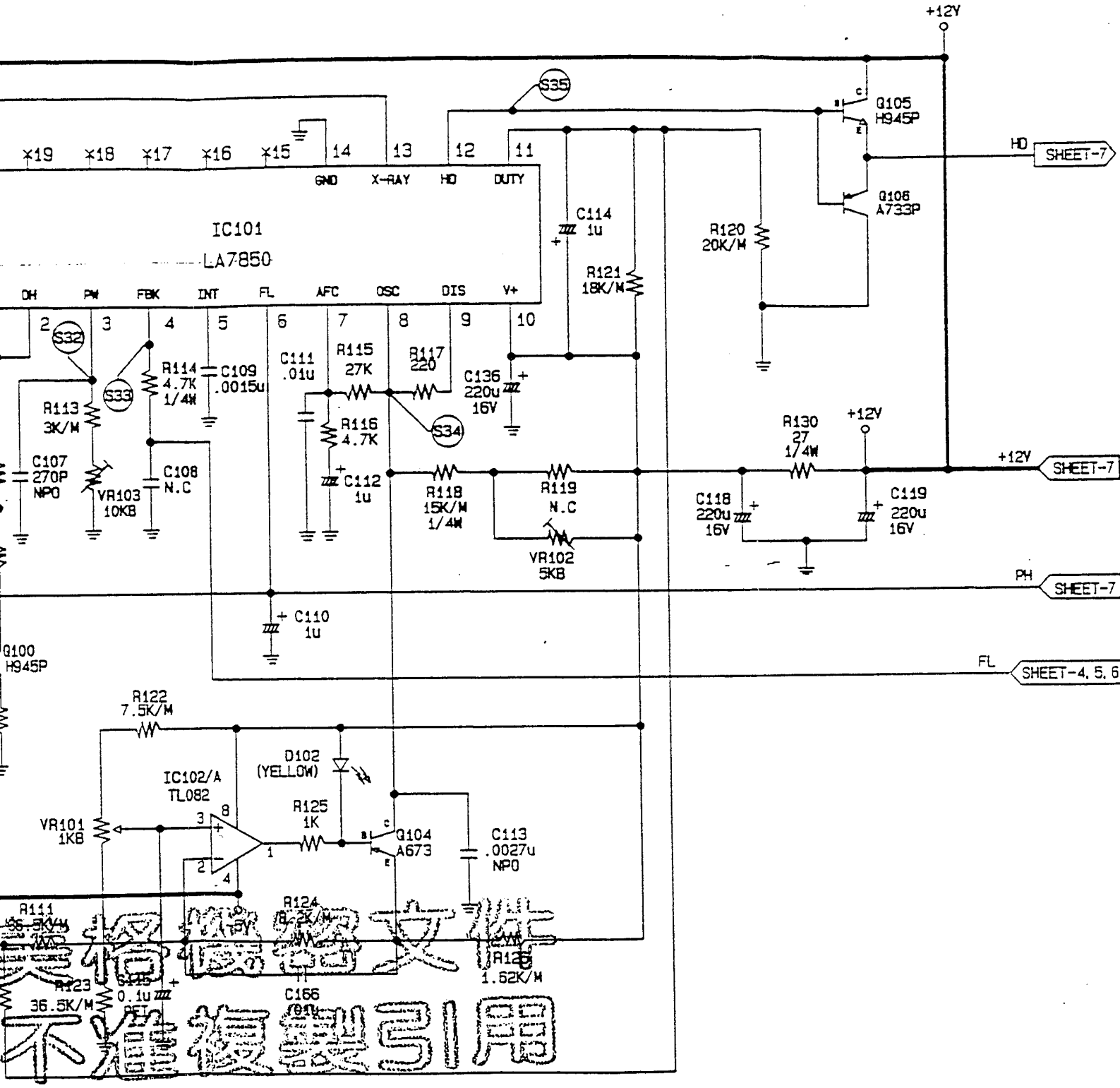
NOTES: IC101 (LA7850) —> PIN10/VCC , PIN14/GND
IC102 (LM358) —> PIN 8/VCC , PIN4/ GND
IC101, IC102 FOR HOR-OSC & PHASE PROCESS
M = METAL/1%

NOTE : NC MEANS "NOT CONNECTED ON PCB BOARD".
ALL RESISTORS 1/8 WATT 5% UNLESS NOTED.
ALL RESISTOR VALUES IN OHMS UNLESS NOTED.
ALL CAPACITORS 50 VOLT UNLESS NOTED.
ALL CAPACITOR VALUES IN uF UNLESS NOTED.

PPROVED BY:		CHECKED BY:		PCB FILE:	1DX17

D E F G H I



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W-0148

MODEL	DX17F
CIRCUITRY	SYNC BOARD

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SHEET	
REV:	
PCB REV:	
DATE	0

PCB FILE:	1DX17JE.PCB	FILE:	0DX7J3-7.SCH

'NOT CONNECTED ON PCB BOARD.
STORS 1/8 WATT 5% UNLESS NOTED.
STOR VALUES IN OHMS UNLESS NOTED.
CITORS 50 VOLT UNLESS NOTED.
CITOR VALUES IN uF UNLESS NOTED.

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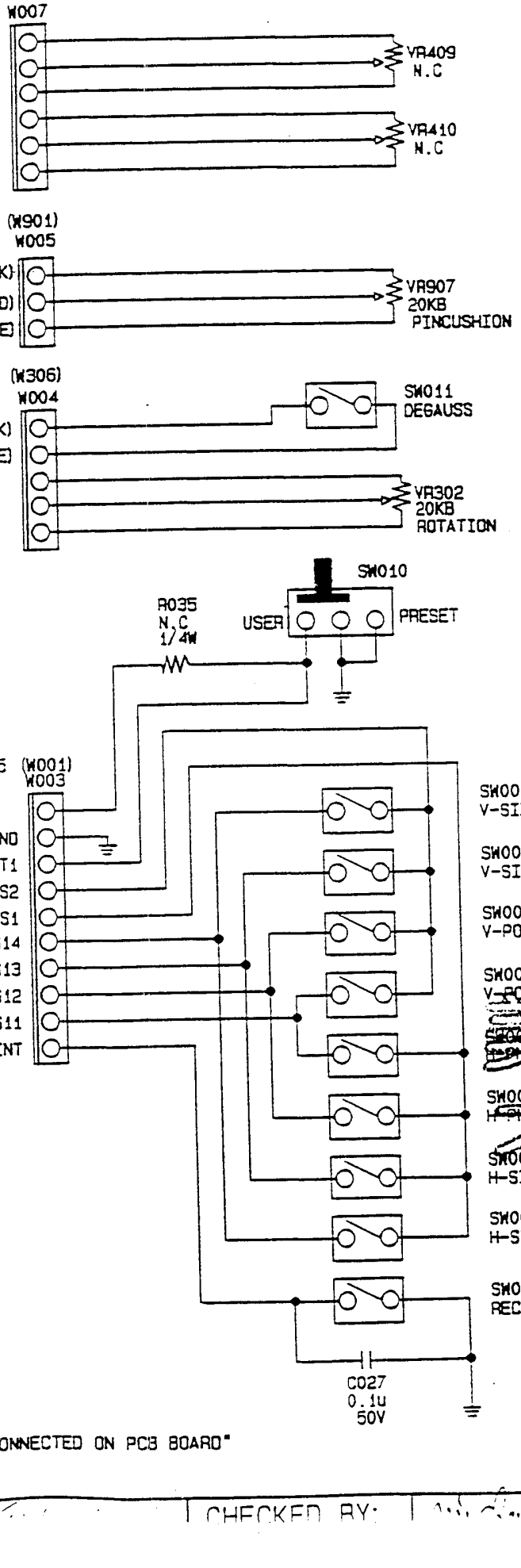
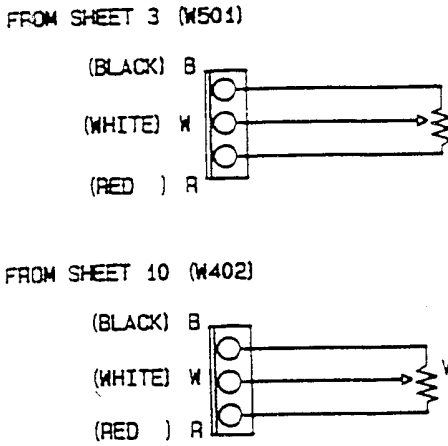
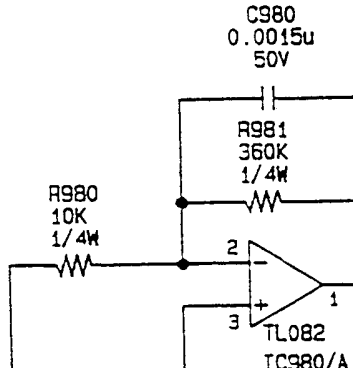
A. B. C. D. E. F.

CONTROL BOARD



VR BOARD





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NC MEANS "NOT CONNECTED ON PCB BOARD"

VR BOARD

FROM SHEET 3 (W501)

(BLACK) B
(WHITE) W
(RED) R

VR503 BRIGHTNESS 20KB

FROM SHEET 10 (W402)

(BLACK) B
(WHITE) W
(RED) R

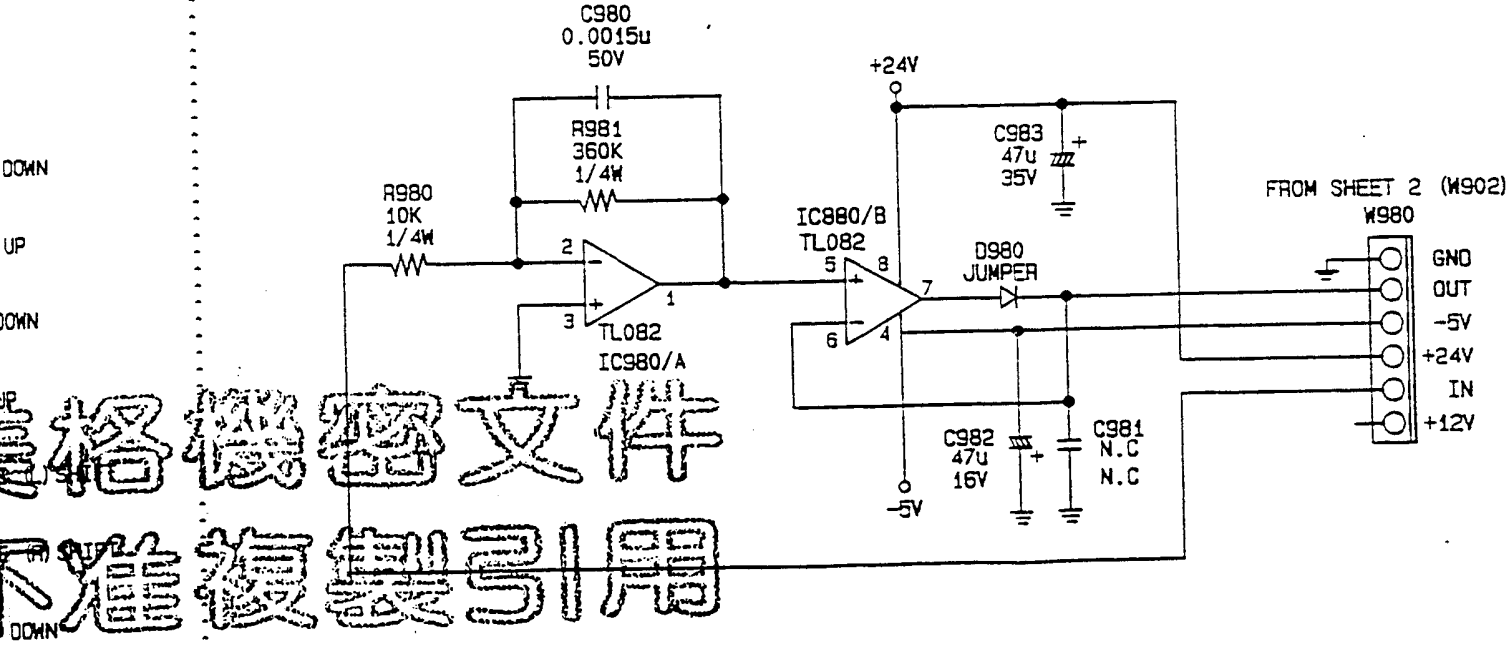
VR408 10KB CONTRAST

LED BOARD

(BLACK) B
(GREEN) G
(YELLOW) Y

LED301

SAMPLE BOARD



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W-014

MODEL	DX17F
CIRCUITRY	CONTROL & VR & LED & SAMPLE BOAR
SHEET	9
REV:	
PCB REV:	C.
FILE:	0DX7S1-7.SCH
DATE	07/2

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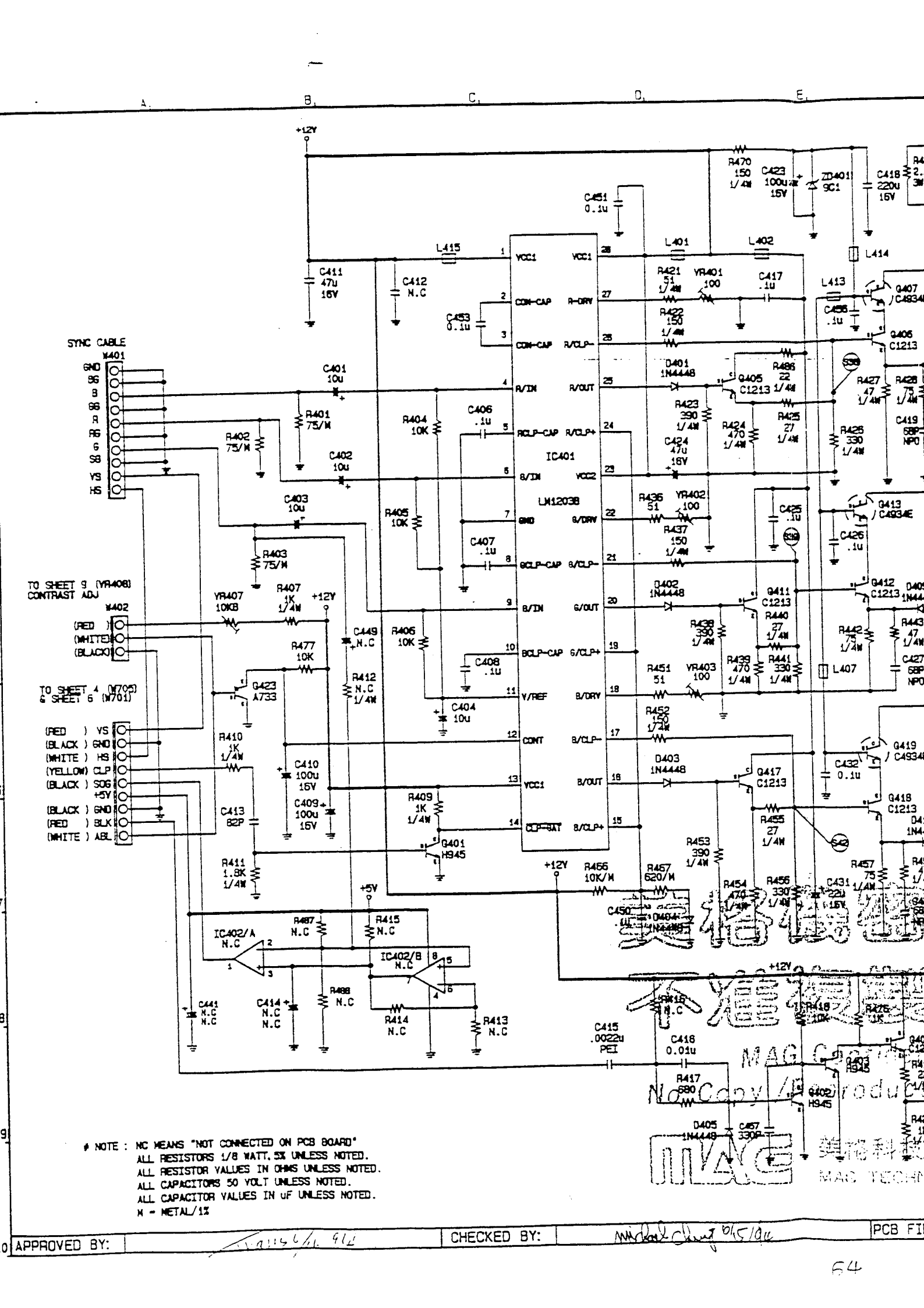
PCB FILE: 1DX17SC.PCB & 1DX17GA.PCB
1DX17XB.PCB & 1DX17WB.PCB



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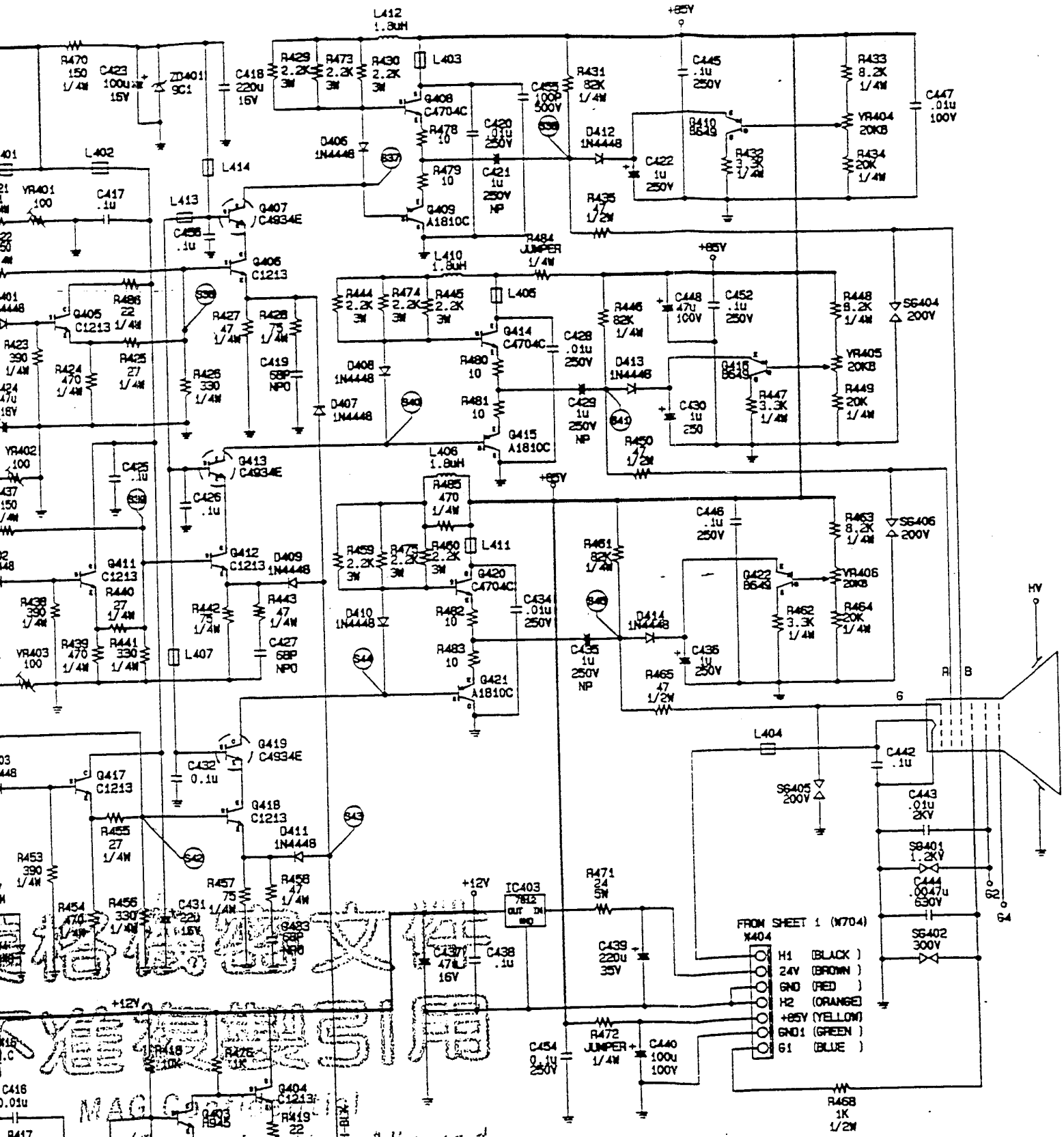

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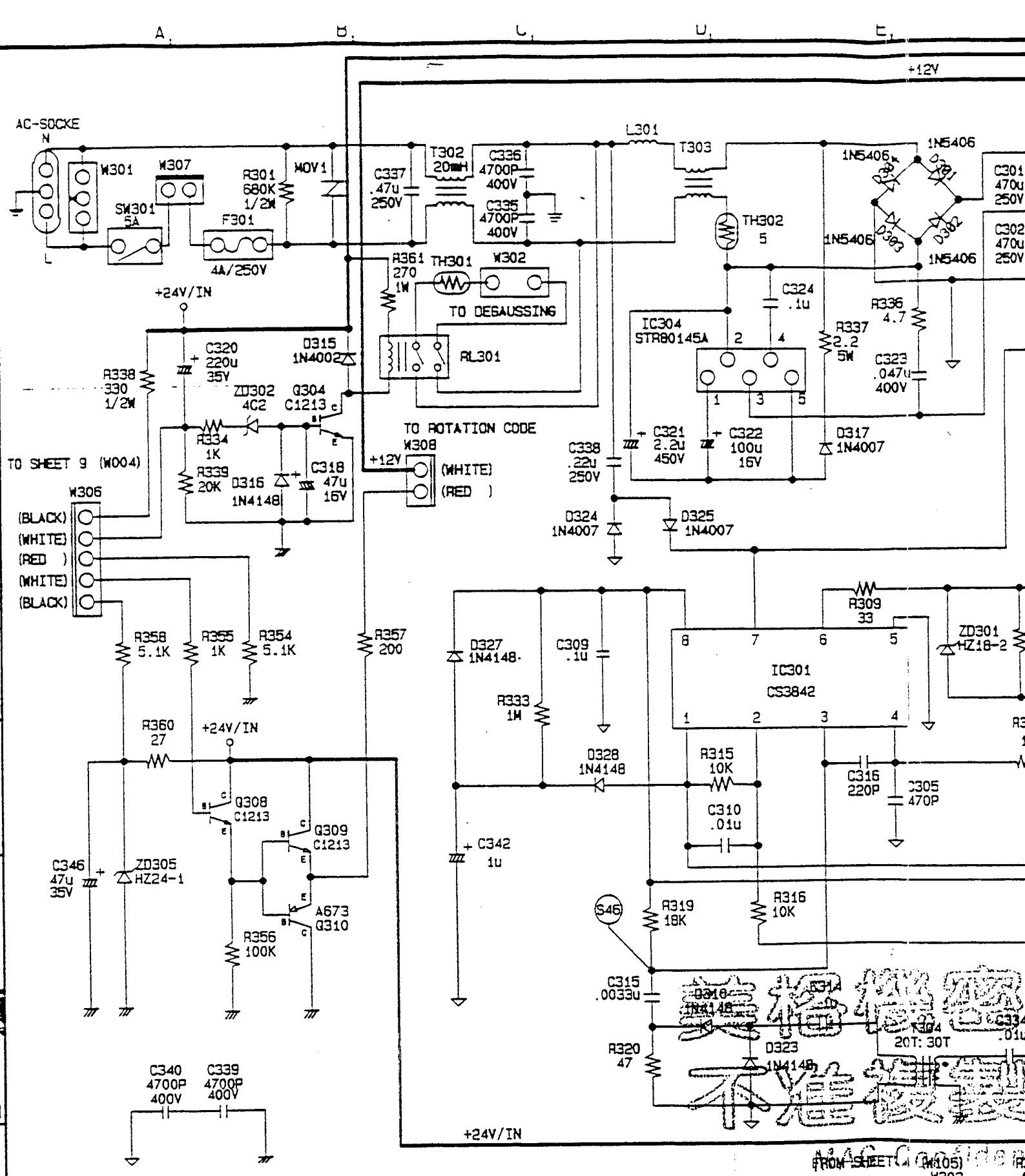
MAG TECHNOLOGY CO., LTD

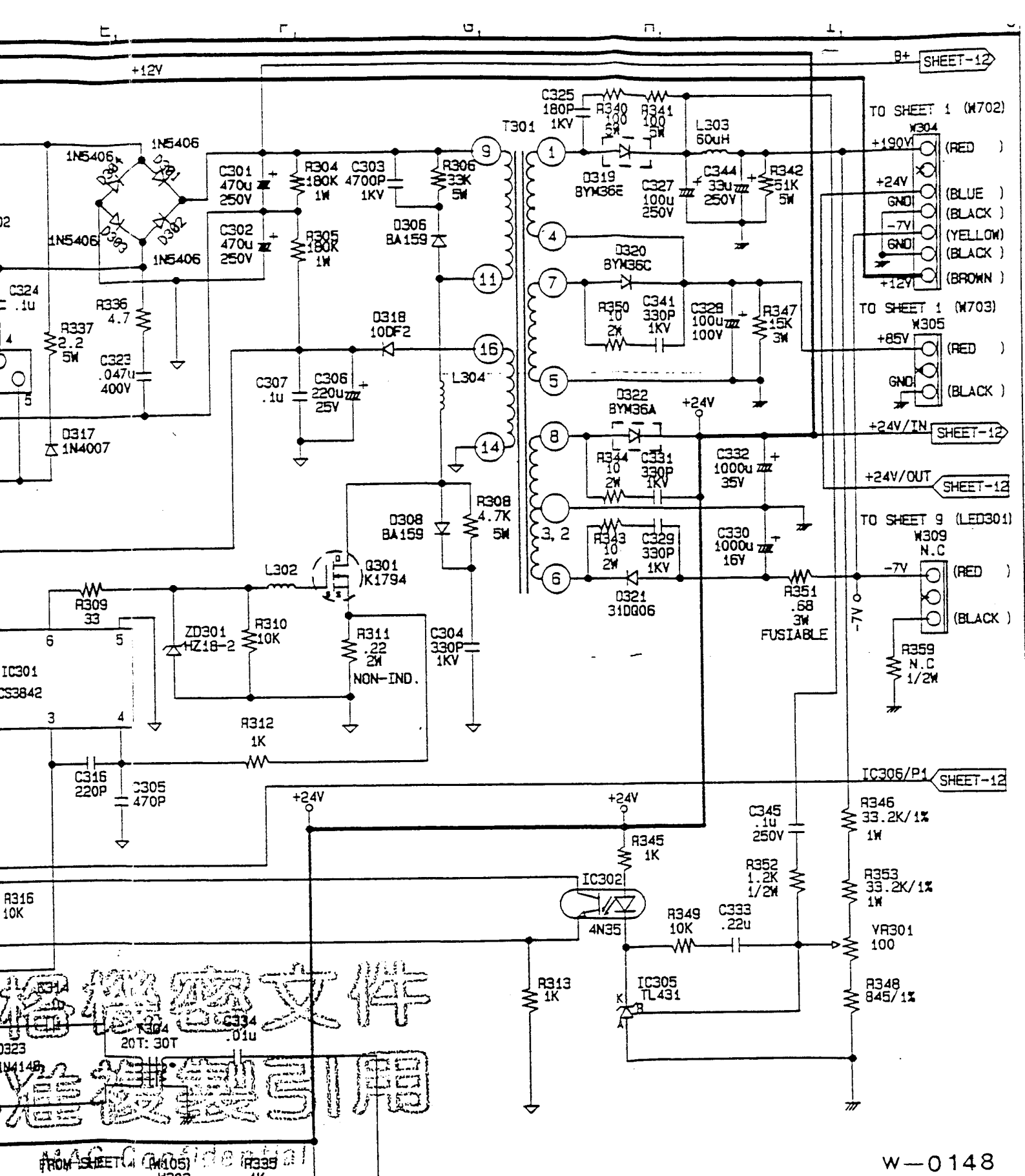
MODEL	DX17F
CIRCUITRY	VIDEO BOARD
MAG TECHNOLOGY	SHEET
	REV:
	PCB REV:
FILE: 0DX7V1-7.SCH	DATE 07
PCB FILE 1DX17VE.PCB	



NOTES: ⏚ : FG GND ⏚ : PRI GND ⏚ : SEC GND

NOTE : NC MEANS "NOT CONNECTED ON PCB BOARD"
ALL RESISTORS 1/4 WATT, 5% UNLESS NOTED.
ALL RESISTOR VALUES IN OHMS UNLESS NOTED.
ALL CAPACITORS 50 VOLT UNLESS NOTED.
ALL CAPACITOR VALUES IN uF UNLESS NOTED.

APPROVED BY:		CHECKED BY:		PCB FILE:	



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MODEL	DX17F
CIRCUITRY	POWER BOARD

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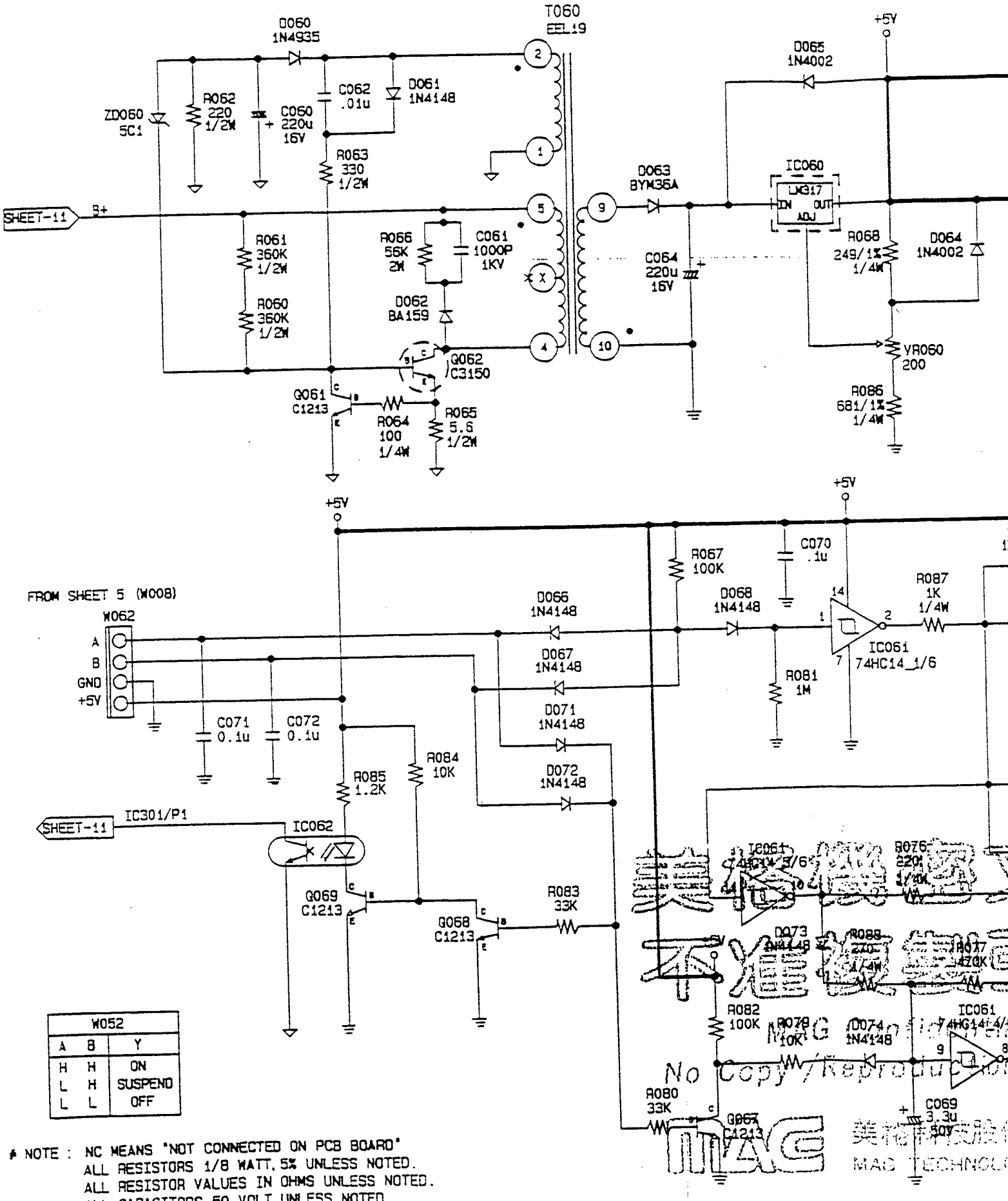
SHEET	11 OF 12
REV:	B07
PCB REV:	D

PCB FILE:	1DX17PD.PCB	FILE:	0DX7P1-7.SCH	DATE	07/25/94



W052		
A	B	Y
H	H	ON
L	H	SUSPEND
L	L	OFF

NOTE : NC MEANS "NOT CONNECTED ON PCB BOARD"
ALL RESISTORS 1/8 WATT, 5% UNLESS NOTED.
ALL RESISTOR VALUES IN OHMS UNLESS NOTED.
ALL CAPACITORS 50 VOLT UNLESS NOTED.
ALL CAPACITOR VALUES IN uF UNLESS NOTED.

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APPROVED BY:		CHECKED BY:		PCB FILE:	

E
F
G
H
I
+5V
D065
1N4002
IC060
LM317
IN OUT
ADJ
R068
249/1%
1/4W
D064
1N4002
C066
33u
VR060
200
R086
681/1%
1/4W
FROM SHEET 1 (IC707)
W063
+24V/IN
+24V/IN
SHEET-11
Q063
B857
+24V/OUT
SHEET-11
+5V
C070
.1u
D068
1N4148
R087
1K
1/4W
D069
1N4148
R069
100K
IC061
74HC14_2/6
R071
5.6K
Q064
C1213
R072
1.5K
1W
FROM SHEET 3 (W100)
W060
R073
10K
R075
1K
IC061
74HC14_1/6
R081
1M
C067
1u
50V
D070
1N4148
IC061
74HC14_3/6
R074
33K
Q066
C1213
Q065
C1213
R070
100K
C068
.47u
R076
220
1/4W
D073
1N4148
R088
220
1/4W
R077
470K
R082
100K
R078
10K
D074
1N4148
IC061
74HC14_4/6
MIDI SD BOARD
W061
GREEN
YELLOW
R078
220
1/4W
C069
3.3u
50V
Q067
C1213
W-014
MODEL
DX17F
CIRCUITRY
POWER BOARD
MAG TECHNOLOGY
SHEET
12 OF
REV:
B0
PCB REV:
D
PCB FILE:
1DX17PD.PCB
FILE:
0DX7P2-7.SCH
DATE
07/25/
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